CONTENTS OF VOLUME 29

Number 1

Instructions to Authors—1990	1	
The Pergamon Phytochemistry Medal and Prize	7	
Announcements	9	
Review Article Number 50 Carbon-13 NMR spectroscopy of pyrrolizidine alkaloids	11	E. Roeder
Growth and Metabolism Nuclear incorporation of [adenine ^{14}C]NAD is altered by compounds which affect poly(ADP-ribose) formation	31	W. A. Tramontano, D. A. Phillips, C. A. Carman and A. M. Massaro
Hydroxyproline-containing diketopiperazines inducing drought resistance in rice	35	K. Ienaga, K. Nakamura, M. Kurohashi, T. Nakanishi and T. Ichii
Respiration of valine by higher plants	41	R. Dunford, D. Kirk and T. ap Rees
Effect of spermine on chloroplastic metal ion efflux of source and sink organs	45	S. Chattopadhyay and B. Ghosh
Constitutive nitrate reductase activity in the Leguminosae	49	M. Andrews, S. M. de Faria, S. G. Mcinroy and J. I. Sprent
Determination of carbonic anhydrase activity using infra-red gas analysis	55	V. R. Sashidhar, M. U. Kumar, T. G. Prasad, A. Seetharam and R. Devendra
Transphosphorylation activity of acid phosphatase of *Physarum polycephalum* KH25	59	T. Kaneko and Y. Katoh
Steroid-specific glucosyltransferases in *Asparagus plumosus* shoots	63	C. Pączkowski, J. Zimowski, D. Krawczyk and Z. A. Wojciechowski
Callose formation during wound-inoculated reaction of *Pinus elliottii* to *Fusarium subglutinans*	71	J. V. Valluri and E. J. Soltes
Changes in glycerolipid content and fatty acid composition during tobacco seed germination	73	A. Koiwai and T. Matsuzaki
Annual changes in the composition of the unsaponifiable oil of *Euphorbia characias*	77	L. Conti, M. Marchetti, F. Soccolini and M. Usai
Flavin-mediated photolysis of mycosporines	81	J. Bernillon, E. Parussini, R. Letoublon, J. Favre-Bonvin and N. Arpin
Ecological Biochemistry Biological effects of plant lectins on the cowpea weevil	85	L. L. Murdock, J. E. Huesing, S. S. Nielsen, R. C. Pratt and R. E. Shade
Participation of *Oryza sativa* leaf wax in appressorium formation by *Pyricularia oryzae*	91	T. Uchiyama and K. Okuyama
Cytochalasins: structure–activity relationships	93	A. Bottalico, R. Capasso, A. Evidente, G. Randazzo and M. Vurro
Caffeoyl ester accumulation in corn leaves inoculated with fungal pathogens	97	P. C. Lyons, K. V. Wood and R. L. Nicholson

α-Homonojirimycin and 2,5-dihydroxymethyl-3,4-dihydroxypyrrolidine: alkaloidal glycosidase inhibitors in the moth *Urania fulgens*	103	G. C. Kite, J. M. Horn, J. T. Romeo, L. E. Fellows, D. C. Lees, A. M. Scofield and N. G. Smith
Inhibition of thioglucosidase-catalysed glucosinolate hydrolysis by castanospermine and related alkaloids	107	A. M. Scofield, J. T. Rossiter, P. Witham, G. C. Kite, R. J. Nash and L. E. Fellows
Two alexines [3-hydroxymethyl-1,2,7-trihydroxypyrrolizidines] from *Castanospermum australe*	111	R. J. Nash, L. E. Fellows, J. V. Dring, G. W. J. Fleet, A. Girdhar, N. G. Ramsden, J. M. Peach, M. P. Hegarty and A. M. Scofield
Biosynthesis		
Biotransformation of caryophyllene by *Diplodia gossypina*	115	W.-R. Abraham, L. Ernst and B. Stumpf
Biotransformation of highly substituted *ent*-kaur-16-enes by *Rhizopus nigricans*	121	A. García-Granados, A. Martínez, M. E. Onorato, M. L. Ruiz, J. M. Sánchez and J. M. Arias
Catharanthus roseus enzyme mediated synthesis of 3-hydroxyvoafrine A and B—a simple route to the voafrines	127	W. Fahn, V. Kaiser, H. Schübel, J. Stöckigt and B. Danieli
Cell Culture and Biotechnology		
Degradation of reticuline in *Berberis* suspension cultures	135	S. Jendrzejewski
Canthin-6-one alkaloids from cell suspension cultures of *Brucea javanica*	141	K. C.-S. Liu, Yang Shi-Lin, M. F. Roberts and J. D. Phillipson
Chemotaxonomy		
Hydrocarbons, sterols, esters and fatty acids in six freshwater chlorophytes	145	P. A. Cranwell, G. H. M. Jaworski and H. M. Bickley
Limonoids from *Ekebergia pterophylla* seed	153	A. R. H. Kehrli, D. A. H. Taylor and M. Niven
Plant Chemistry		
Vomifoliol 1-*O*-β-D-xylopyranosyl-6-*O*-β-D-glucopyranoside: a disaccharide glycoside from apple fruit	161	W. Schwab and P. Schreier
Volatile components of starfruit	165	G. MacLeod and J. M. Ames
Daucane esters from *Ferula rigidula*	173	M. Miski and J. Jakupovic
Armillane, a saturated sesquiterpene ester from *Armillaria mellea*	179	D. M. X. Donnelly and R. M. Hutchinson
Sesquiterpene lactones from *Dicoma* species	183	C. Zdero and F. Bohlmann
Glaucolides, fulvenoguaianolides and other sesquiterpene lactones from *Pentzia* species	189	C. Zdero and F. Bohlmann
Sesquiterpene lactones and farnesol derivatives from *Arctotis* and *Arctotheca* species	195	F. Tsichritzis, J. Jakupovic and F. Bohlmann
A heliangolide, 3-hydroxyumbelliferone derivatives and diterpenes from *Bahia ambrosioides*	205	C. Zdero, F. Bohlmann and H. M. Niemeyer
Two triterpene glycosides from *Isertia haenkeana*	209	F. J. Arriaga, A. Rumbero and P. Vazquez
Mass spectrometry of prieureanin limonoids	215	S. D. Jolad and J. J. Hoffmann
Pregnane glycosides from *Boucerosia aucheriana*	229	T. Tanaka, S. Tsukamoto and K. Hayashi
A triterpenoid saponin from *Panax pseudo-ginseng* subsp. *himalaicus* var. *angustifolius*	239	Y. N. Shukla and R. S. Thakur

Two fungicidal phenylethanones from *Euodia lunu-ankenda* root bark	243	V. Kumar, V. Karunaratne, M. R. Sanath, K. Meegalle and J. K. MacLeod
Coumarin glycosides from *Edgeworthia chrysantha*	247	K. Baba, M. Taniguti, Y. Yoneda and M. Kozawa
Ellagic compounds from *Diplopanax stachyanthus*	251	D. D. Khac, S. Tran-Van, A. M. Campos, J.-Y. Lallemand and M. Fetizon
Lignans from *Aristolochia birostris*	257	L. M. Conserva, M. S. da Silva and R. Braz Filho
Decarboxylated ascorbigens in the heartwood of *Chamaecyparis pisifera*	261	S. Hasegawa, H. Koyanagi and Y. Hirose
Gallic acid esters of bergenin and norbergenin from *Mallotus japonicus*	267	R. Saijo, G. Nonaka and I. Nishioka
Cirrhopetalanthrin, a dimeric phenanthrene derivative from the orchid *Cirrhopetalum maculosum*	271	P. L. Majumder, A. Pal and M. Joardar
Natural (−)-fisetinidol-(4,8)-(−)-epicatechin profisetinidins	275	J. P. Steynberg, J. F. W. Burger, J. C. S. Malan, A. Cronjé, D. A. Young and D. Ferreira
4-Carboxymethyl flavan-3-ols and procyanidins from *Davallia divaricata*	279	T.-H. Hwang, Y. Kashiwada, G. Nonaka and I. Nishioka
Profisetinidin-type 4-arylflavan-3-ols and related δ-lactones	283	M. Bam, J. C. S. Malan, D. A. Young, E. V. Brandt and D. Ferreira
Flavonol 3-*O*-triglycosides from *Actinidia* species	289	R. F. Webby and K. R. Markham
Barbisine, a C_{20}-diterpenoid alkaloid from *Delphinium barbeyi*	293	P. Kulanthaivel, E. M. Holt, J. D. Olsen and S. W. Pelletier
Acridone alkaloids and coumarins from *Pleiospermium alatum*	297	B. M. R. Bandara, A. A. L. Gunatilaka, E. M. K. Wijeratne and J. K. MacLeod
Short Reports		
Norophthalmic acid and ophthalmic acid from the brown alga, *Undaria pinnatifida*	303	T. Ogawa, Y. Oka and K. Sasaoka
ϵ-Palmitolactone from *Ageratina viscosa*	305	R. Torrenegra, J. A. Pedrozo, J. Robles and O. Fuentes
Glycolipids from *Gracilaria verrucosa*	307	B. W. Son
Iridoid glucosides from *Viburnum suspensum*	310	T. Iwagawa, S. Yaguchi and T. Hase
Glaucolides and related sesquiterpene lactones from *Vernonia incana*	313	A. Bardón, C. A. N. Catalán, A. B. Gutiérrez and W. Herz
Diterpenes from *Eremophila* species	316	E. L. Ghisalberti, P. R. Jefferies and H. T. N. Vu
12,15-Dihydroxylabda-8(17),13-dien-19-oic acid from *Guizotia scabra*	319	Y. Fujimoto, K. Kakinuma, T. Eguchi, N. Ikekawa, N. Hirayama A. Mbarushimana and D. Ntahomvukiye
Diterpenes and other constituents of *Eupatorium salvia*	321	A. G. González, J. B. Barrera, J. G. Díaz, E. Mª R. Pérez, A. C. Yanes, P. Rauter and J. Pozo
Diterpenoids from Chilean *Baccharis* species	324	C. L. F. Faini and M. Castillo

Diterpenes and umbelliferone derivatives from *Haplopappus deserticola*	326	C. Zdero, F. Bohlmann and H. M. Niemeyer
(−)-Salzol, an isopimarane diterpene, and a chalcone from *Hyptis salzmanii*	329	I. Messana, F. Ferrari, M. A. de Moraes e Souza and E. Gács Baitz
21α,30-Dihydroxy-D:A-friedooleanan-3-one from *Salacia reticulata* var. *β-diandra* stem bark	333	V. Kumar, D. B. T. Wijeratne and C. Abeygunawardena
Unsymmetric tetracyclic triterpenoid from *Cissus quadrangularis*	336	M. M. Gupta and R. K. Verma
Acylated triterpene glycoside from roots of *Dipsacus asper*	338	I. Kouno, A. Tsuboi, M. Nanri and N. Kawano
Sitosterol 3-*O*-*β*-D-glucuronopyranoside from *Senecio bonariensis*	340	E. A. Jares, M. C. Tettamanzi and A. B. Pomilio
Spirostanol saponins from *Yucca aloifolia* rhizomes	342	S. Bahuguna and O. P. Sati
Pregnanes and cardenolides from *Periploca sepium*	344	J. Xu, K. Takeya and H. Itokawa
Scorazanone, a 1-aza-anthraquinone from *Goniothalamus scortechinii*	346	L. B. Din, S. M. Colegate and D. A. Razak
A dihydrobenzofuran lignan from *Croton erythrochilus*	348	L. A. C. Pieters, D. A. Vanden Berghe and A. J. Vlietinck
Dihydroeleutherinol, a dihydronaphthopyran derivative from unripe seeds of *Cassia torosa*	350	S. Kitanaka, M. Takahashi and M. Takido
Flavonoids, coumarins and acridone alkaloids from the root bark of *Citrus limonia*	351	S.-H. Chang
Flavonol glycosides from *Eupatorium tinifolium*	353	M. D'Agostino, F. De Simone, A. Dini, E. Ramundo and F. Zollo
A coumestan from *Lotus creticus*	355	Z. F. Mahmoud, M. E. Amer, M. S. A. Kader and N. A. Abdel-Salam
Tatsidine, a norditerpenoid alkaloid from *Delphinium tatsienense*	357	B. S. Joshi, H. K. Desai, S. W. Pelletier, J. K. Snyder, X. Zhang and S. Chen
Two steroidal alkaloid glycosides from *Veratrum taliense*	359	M. Mizuno, Tan Ren-Xiang, Zhen Pei, Min Zhi-Da, M. Iinuma and T. Tanaka
iso-Lycopsamine, a pyrrolizidine alkaloid from *Heliotropium keralense*	361	S. Ravi, A. J. Lakshmanan and W. Herz
Book Review Biotechnology in Agriculture and Forestry: Crops II: edited by Y. P. S. Bajaj	365	A. M. Mayer

Number 2

Review Article Number 51 Metabolism, enzymology and possible roles of 4-aminobutyrate in higher plants	367	V. Satya Narayan and P. M. Nair
Growth and Metabolism Polyamines of unicellular thermoacidophilic red alga *Cyanidium caldarium*	377	K. Hamana, S. Matsuzaki, M. Niitsu, K. Samejima and H. Nagashima

Synthesis and auxin activity of 5-substituted 1-naphthaleneacetic acids	381	M. A. Venis and E. W. Thomas
Synthesis of radioactive zeatin riboside and related compounds by alkylation of purine moieties	385	H. Young, D. S. Letham, C. H. Hocart and J. V. Eichholzer
Electrophoretic and molecular weight anomalies associated with broad bean polyphenoloxidase in SDS-PAGE electrophoresis	387	W. H. Flurkey
α-Mannosidases from suspension-cultured sugar beet cells	393	H. Masuda, S. Narita and S. Sugawara
Cell wall changes in kiwifruit following post harvest ethylene treatment	399	R. J. Redgwell, L. D. Melton and D. J. Brasch
Uptake of furconazole-*cis* by etiolated wheat seedlings and its effect on exogenous palmitic acid incorporation into lipids	409	M. Gautier, P. Moreau, J. Bessoule, R. Lessire, C. Anding and C. Cassagne
Effect of some sterol-biosynthesis-inhibiting fungicides on the biosynthesis of polyisoprenoid compounds in winter wheat seedlings	417	I. A. Khalil and E. I. Mercer
Fluctuation of phytoecdysteroids in developing shoots of *Taxus cuspidata*	425	P. V. Ripa, E. A. Martin, S. M. Cocciolone and J. H. Adler
Distribution of free and combined phenolic acids in wheat internodes	429	T. B. T. Lam, K. Iiyama and B. A Stone
Roles of *o*-quinones and their polymers in the enzymic browning of apples	435	M.-A. Rouet-Mayer, J. Ralambosoa and J. Philippon
Inhibitory effect of hydroxyflavones on the exogenous NADH dehydrogenase of plant mitochondrial inner membranes	441	P. Ravanel, S. Creuzet and M. Tissut
Ecological Biochemistry		
Can *Phaseolus* PGIP inhibit pectic enzymes from microbes and plants?	447	F. Cervone, G. De Lorenzo, R. Pressey, A. G. Darvill and P. Albersheim
Structure–activity relationships of the saponin α-hederin	451	M. Takechi and Y. Tanaka
Ontogenetic variation of biologically active natural products in *Ageratina adenophora*	453	P. Proksch, V. Wray, M. B. Isman and I. Rahaus
Methoxy furan auranols with fungistatic activity from *Lonchocarpus castilloi*	459	F. Gómez-Garibay, R. Reyes Chilpa, L. Quijano, J. S. Calderón Pardo and T. Ríos Castillo
Effect of gramine on the susceptibility of barley leaves to *Pseudomonas syringae*	465	B. A. Sepulveda and L. J. Corcuera
Biosynthesis		
Biosynthesis and metabolism of pyrazole by *Cucumis sativus:* enzymic cyclization and dehydrogenation of 1,3-diaminopropane	469	E. G. Brown and F. M. Diffin
Synthesis of (+)-5-*epi*-aristolochene and (+)-1-deoxycapsidiol from capsidiol	479	I. M. Whitehead, D. F. Ewing, D. R. Threlfall, D. E. Cane and P. C. Prabhakaran
Triterpenoid saponin production in callus and multiple shoot cultures of *Gypsophila* spp.	483	D. Pauthe-Dayde, M. Rochd and M. Henry
The biosynthesis of piperine in *Piper nigrum*	489	J. G. Geisler and G. G. Gross
Cell Culture and Biotechnology		
Volatile monoterpenoid constituents of the plantlets of *Mentha spicata* produced by shoot tip culture	493	T. Hirata, S. Murakami, K. Ogihara and T. Suga

Effects of inorganic phosphate on sugar catabolism by suspension-cultured *Catharanthus roseus* — 497 X.-N. Li and H. Ashihara

Chemotaxonomy
Flavonoid profiles of New Zealand *Libocedrus* and related genera — 501 K. R. Markham, A. Franke, B. P. J. Molloy and R. F. Webby

Co-occurrence of pyrrolizidine alkaloids and acylpyrrols in *Senecio magnificus* and constituents of other Australian *Senecio* species — 509 C. Zdero, F. Bohlmann, R. M. King and L. Haegi

Plant Chemistry
Isolation and characterization of 2-*O*-β-D-glucopyranosyl-L-malic acid from *Synadenium pereskiifolium* — 513 K. Hermansson, L. Kenne, G. M. Rukunga and G. Samuelsson

α,β-Unsaturated-γ-lactones from *Sedum telephium* roots — 517 S. Y. Fung, J. Schripsema and R. Verpoorte

2-Methyl-6-methylene-7-octen-4-one, a constituent of *Lippia multiflora* essential oil — 521 G. Lamaty, C. Menut, J. M. Bessiere, J. A. Ouamba and T. Silou

Two non-glycosidic iridoids from *Rehmannia glutinosa* — 523 T. Morota, H. Sasaki, K. Sugama, H. Nishimura, M. Chin and H. Mitsuhashi

Furantriol, a lactarane sesquiterpene from *Lactarius mitissimus* — 527 W. M. Daniewski, M. Gumułka and P. Skibicki

Isocarotane and carotane derivatives from *Ferula jaeschkeana* — 531 S. N. Garg, Vishwapaul and S. N. Rastogi

Schkuhripinnatolides, unusual sesquiterpene lactones from *Schkuhria pinnata* — 535 U. Ganzer and J. Jakupovic

Sesquiterpene lactones from *Artemisia herba-alba* — 541 J. F. Sanz, G. Castellano and J. A. Marco

Sesquiterpene lactones from *Carpesium divaricatum* — 547 M. Maruyama

Sesquiterpene lactones and a C_{20} aliphatic lactone from Texas bitterweed, *Hymenoxys odorata* — 551 F. Gao, H. Wang, T. J. Mabry, W. H. Watson and R. P. Kashyap

Sesquiterpene lactones and lignanes from *Rudbeckia* species — 561 M. Vasquez, L. Quijano, F. R. Fronczek, F. A. Macias, L. E. Urbatsch, P. B. Cox and N. H. Fischer

Labdane derivatives and alicyclic diterpenes from *Gutierrezia espinosae* — 567 C. Zdero, F. Bohlmann and H. M. Niemeyer

ent-Pimarene derivatives from *Palafoxia arida* — 573 C. Zdero, F. Bohlmann and R. M. King

neo-Clerodane diterpenoids from *Teucrium abutiloides* — 579 M. C. de la Torre, B. Rodríguez, F. Piozzi, G. Savona, M. Bruno and M. C. Carreiras

Phytane- and labdane-type diterpenoids from the liverwort *Haplomitrium mnioides* — 585 Y. Asakawa, M. Toyota and T. Masuya

Diterpenes from *Sideritis sventenii* and *S. cystosiphon* — 591 B. M. Fraga, M. G. Hernández, J. M. H. Santana and J. M. Arteaga

Triterpenoid saponins from *Pulsatilla campanella* — 595 X.-C. Li, D.-Z. Wang, S.-G. Wu and C.-R. Yang

Phlebic acids C and D, lichen acids from *Peltigera aphthosa* — 601 F. W. Bachelor, G. G. King and J. Richardson

Naphthoquinones from *Dionaea muscipula* — 605 B. Kreher, A. Neszmélyi and H. Wagner

Glycosidically bound aroma components from sour cherry 607 W. Schwab, G. Scheller and P. Schreier

Spirolaxine and sporotricale: two long-chain phthalides produced by *Sporotrichum laxum* 613 A. Arnone, G. Assante, G. Nasini and O. Vajna de Pava

Geranyl derivatives of *p*-coumaric acid from *Chrysothamnus pulchellus* 617 J. Jakupovic, M. Grenz, M. Miski, F. Bohlmann and P. E. Boldt

Lusianthrin and lusianthridin, two stilbenoids from the orchid *Lusia indivisa* 621 P. L. Majumder and S. Lahiri

Chromones and flavans from *Pancratium maritimum* 625 A. A. Ali, M. A. Makboul, A. A. Attia and D. T. Ali

Flavonoids, flavonolignans and a phenylpropanoid from *Onopordon corymbosum* 629 M. L. Cardona, B. Garcia, J. R. Pedro and J. F. Sinisterra

5-Hydroxy-6,2′-dimethoxyflavone from *Primula denticulata* 633 E. Wollenweber, M. Iinuma, T. Tanaka and M. Mizuno

Cyclopiamide, an isoindolo[4,6-*cd*]indole from *Penicillium cyclopium* 639 C. W. Holzapfel, M. W. Bredenkamp, R. M. Snyman, J. C. A. Boeyens and C. C. Allen

Short Reports

Two iridoid glucosides from *Gentiana verna* 643 E. Mpondo Mpondo and J. Garcia

Bisabolane related glycosides from *Carthamus lanatus* 645 A. San Feliciano, M. Medarde, B. Del Rey, J. M. Miguel Del Corral and A. F. Barrero

Guaianolides from *Pericome caudata* 649 S. D. Jolad, J. J. Hoffmann, B. N. Timmermann, R. B. Bates, F. A. Camou and S. P. McLaughlin

Clerodane derivatives from *Polyalthia viridis* 653 A. Kijjoa, M. M. M. Pinto, P. M. M. Pinho, B. Tantisewie and W. Herz

2α,3α-Dihydroxycativic acid, a diterpenoid from *Baccharis petiolata* 656 J. C. Gianello, M. J. Pestchanker, C. E. Tonn, M. Guo and O. S. Giordano

Terpenes from *Aristolochia triangularis* 660 L. M. X. Lopes, V. da S. Bolzani, L. M. V. Trevisan and T. M. Grigolli

Diterpenes from *Euphorbia neriifolia* 662 A. S. Ng

Structural revision of rabdosin B from *Rabdosia japonica* 664 Wang Maotian, Liu Chenjiang and Li Jicheng

A cembranoid diterpene from *Cleome viscosa* 666 R. Jente, J. Jakupovic and G. A. Olatunji

Terpenoids from *Salvia willeana* and *S. virgata* 668 M. C. de la Torre, M. Bruno, F. Piozzi, G. Savona, B. Rodriguez and N. A. Arnold

Cleocarpone, a triterpenoid from *Cleome brachycarpa* 670 V. U. Ahmad, S. Qazi, N. B. Zia, C. Xu and J. Clardy

A lanostanoid of Formosan *Ganoderma lucidum* 673 C.-N. Lin, W.-P. Tome and S.-J. Won

Isokaerophyllin, a butyrolactone from *Bupleurum salicifolium* 675 A. G. González, R. Estévez-Reyes, C. Mato and A. Mª Estévez-Braun

Lecanoric acid from the mycobiont of the lichen *Stereocaulon curtatum* 678 N. Hamada and T. Ueno

Nivetin, a neoflavonoid from *Echinops niveus* 680 R. P. Singh and V. B. Pandey

A glucosylated acylflavone from *Sideritis raeseri* 681 C. Gabrieli and E. Kokkalou

A steroidal alkaloid from *Buxus papillosa* 683 A.-ur-Rahman, Z. Iqbal, M. Alam, M. I. Choudhary, H. Nasir and T. Fatima

Alkaloids from seeds of *Strychnos variabilis* and *S. longicaudata* 686 P. Thepenier, M.-J. Jacquier, G. Massiot, L. Le Men-Olivier and C. Delaude

N^aCinnamoylhistamine derivates from *Lycium cestroides* 688 C. A. Chiale, J. L. Cabrera and H. R. Juliani

Pyrrolizidine alkaloids from *Lithospermum erythrorhizon* 690 E. Roeder and B. Rengel

Number 3

Growth and Metabolism

The effect of modified pectin, pectin fragments and cations on *Phytophthora palmivora* zoospores 695 Q. Zhang, J. M. Griffith, J. G. Moore, J. R. Iser and B. R. Grant

Synthesis of the naturally occurring cytokinin 2'-deoxyzeatin riboside 701 L. de Napoli, A. Evidente, G. Piccialli, C. Santacroce and R. Vellone

Anodic peroxidase isoenzymes and polyphenol oxidase activity from cucumber fruit: tissue and substrate specificity 705 A. R. Miller, T. J. Kelley and C. V. Mujer

Functional properties of purified ferredoxin-glutamate synthase from *Chlamydomonas reinhardtii* 711 C. Gotor, J. M. Martínez-Rivas, A. J. Márquez and J. M. Vega

Properties of primer-dependent starch synthesis catalysed by starch synthase from potato tubers 719 T. Baba, M. Noro, M. Hiroto and Y. Arai

Composition and structural features of cell wall polysaccharides from tomato fruits 725 G. B. Seymour, I. J. Colquhoun, M. S. DuPont, K. R. Parsley and R. R. Selvendran

Phenolic acid bridges between polysaccharides and lignin in wheat internodes 733 K. Iiyama, T. B. T. Lam and B. A. Stone

Maize pollen lipids 739 G. Bianchi, C. Murelli and E. Ottaviano

Long-chain aldehyde production in thalli culture of the marine green alga *Ulva pertusa* 745 T. Fujimura, T. Kawai, M. Shiga, T. Kajiwara and A. Hatanaka

Effects of daylength on the monoterpene composition of leaves of *Mentha* x *piperita* 749 B. Voirin, N. Brun and C. Bayet

Rearranged caryophyllenes by biotransformation with *Chaetomium cochliodes* 757 W.-R. Abraham, L. Ernst and H.-A. Arfmann

Effects of physiological and ontogenetical ageing on sterol levels and composition in pea leaves 765 M. E. Olsson and C. Liljenberg

Identification of 1-methoxyindolyl-3-methyl isothiocyanate as an indole glucosinolate breakdown product 769 A. B. Hanley and K. R. Parsley

Ecological Biochemistry

Allelopathic effect of hydroxamic acids from cereals on *Avena sativa* and *A. fatua* 773 F. J. Pérez

Minor phytotoxins from the blackleg fungus *Phoma lingam* 777 M. S. C. Pedras, G. Séguin-Swartz and S. R. Abrams

Dammara-20,25-dien-3β,24α-diol: a natural repellent of *Acromyrmex octospinosus* 783 G. B. Hammond, N. C. Baenziger and D. F. Wiemer

Cucurbitacins protect cucumber tissue against infection by *Botrytis cinerea* 787 N. Bar-Nun and A. M. Mayer

Molluscicidal saponins of *Polyscias dichroostachya* 793 N. Gopalsamy, J. Gueho, H. R. Julien, A. W. Owadally and K. Hostettmann

Structures of antifungal diarylheptenones, gingerenones A, B, C and isogingerenone B, isolated from the rhizomes of *Zingiber officinale* 797 K. Endo, E. Kanno and Y. Oshima

Antifungal activity of isoflavonoids in different reduced stages on *Rhizoctonia solani* and *Sclerotium rolfsii* 801 M. Weidenbörner, H. Hindorf, H. C. Jha, P. Tsotsonos and H. Egge

Effects of stress on alkaloid metabolism in *Crinum asiaticum* 805 S. Ghosal, S. K. Singh and S. G. Unnikrishnan

Molluscicidal quinoline alkaloids from *Galipea bracteata* 813 P. C. Vieira and I. Kubo

Biosynthesis

Biosynthesis of indoxyl derivatives in *Isatis tinctoria* and *Polygonum tinctorium* 817 W. Maier, B. Schumann and D. Gröger

Biogenetic relationship of polyoxygenated diterpenes in *Coleus forskohlii* 821 A. Akhila, K. Rani and R. S. Thakur

Cell Culture and Biotechnology

Phosphatidylinositol turnover in *Brassica* cultures and its stimulation by amino acids and polyamines 825 U. Sethi, A. Basu and S. Guha-Mukherjee

Enzyme-linked immunosorbent assay for the determination of quassinoids in *Ailanthus altissima* tissues and cultivated cells 829 M. Jaziri

Biotransformation of digitoxigenin by ginseng hairy root cultures 837 K. Kawaguchi, M. Hirotani, T. Yoshikawa and T. Furuya

Influence of growth regulators and an elicitor on phenylpropanoid metabolism in suspension cultures of *Vanilla planifolia* 845 C. Funk and P. Brodelius

Induction of 6-methoxymellein and 6-hydroxymellein production in carrot cells 849 F. Marinelli, V. N. Ronchi, D. Pini and P. Salvadori

Plant Chemistry

A galactomannan from *Crotalaria medicaginea* seeds 853 A. K. Gupta and J. N. BeMiller

Butanolides from *Litsea japonica* 857 H. Tanaka, T. Nakamura, K. Ichino, K. Ito and T. Tanaka

An NMR study of the solution conformation of two asperuloside derivatives 861 B. Podányi, Á. Kocsis, L. Szabó and R. S. Reid

Cereia-1,4-dienaldehyde, a sesquiterpene from *Rosa rugosa* 867 Y. Hashidoko, S. Tahara and J. Mizutani

Hydroindene sesquiterpenes from *Thapsia villosa* 873 U. W. Smitt, C. Cornett, E. Norup and S. B. Christensen

Sesquiterpenes and flavonoids from *Tessaria* species 877 E. Guerreiro, M. J. Pestchanker, L. Del Vitto and O. S. Giordano

Sesquiterpene aryl esters from *Ferulago antiochia* 881 M. Miski, H. A. Moubasher and T. J. Mabry

Sesquiterpenoids and other constituents from *Tanacetum cilicium* 887 S. Öksüz

Sesquiterpene lactones from *Perityle emoryi*	891	C. Zdero, F. Bohlmann and H. M. Niemeyer
Guaianolides, pseudoguaianolides and an aliphatic lactone from *Hymenoxys scaposa* var. *villosa*	895	F. Gao, H. Wang, T. J. Mabry and M. W. Bierner
Sesquiterpenoid and other metabolites from two *Bahia* species	901	A.-L. Pérez, D. A. Nieto and A. Romo de Vivar
Diterpenoids and acetogenins of *Blepharizonia plumosa*	905	S. D. Jolad, J. J. Hoffmann, B. N. Timmermann, R. B. Bates, F. A. Camou and S. P. McLaughlin
Tricyclic diterpenoids from root bark of *Azadirachta indica*	911	I. Ara, B. S. Siddiqui, S. Faizi and S. Siddiqui
Triterpenes in *Parthenium argentatum*, structures of argentatins C and D	915	A. Romo de Vivar, M. Martínez-Vázquez, C. Matsubara, G. Pérez-Sánchez and P. Joseph-Nathan
Dammarane triterpenes of *Salvia hierosolymitana*	919	S. Pedreros, B. Rodríguez, M. C. de la Torre, M. Bruno, G. Savona, A. Perales and M. R. Torres
Malonate half-esters of homolanostanoid from an Asian *Ganoderma* fungus	923	Chairul, T. Tokuyama, M. Nishizawa, M. Shiro, H. Tokuda and Y. Hayashi
Curculigol, a cycloartane triterpene alcohol from *Curculigo orchioides*	929	T. N. Misra, R. S. Singh, D. M. Tripathi and S. C. Sharma
A spiranic withanolide from *Jaborosa odonelliana*	933	E. S. Monteagudo, J. C. Oberti, E. G. Gros and G. Burton
Steroidal glycosides from *Agave cantala*	937	G. C. Uniyal, P. K. Agrawal, R. S. Thakur and O. P. Sati
Anthrone and chromone components of *Aloe cremnophila* and *A. jacksonii* leaf exudates	941	J. M. Conner, A. I. Gray, T. Reynolds and P. G. Waterman
3,4-Dihydroisocoumarins from *Ononis natrix*	945	A. San Feliciano, J. Mª Miguel del Corral, L. M. Cañedo and M. Medarde
Acylated anthocyanins of *Clitoria ternatea* flowers and their acyl moieties	949	N. Terahara, N. Saito, T. Honda, K. Toki and Y. Osajima
Oligomeric flavan-3-ols from medicinal willow bark	955	H. Kolodziej
Xanthones of *Halenia elliptica*	961	H. Dhasmana and H. S. Garg
19-(*R*)- and 19-(*S*)-Hydroxydihydrokoumine from *Gelsemium elegans*	965	L.-Z. Lin, G. A. Cordell, C.-Z. Ni and J. Clardy
Steroidal alkaloids from *Holarrhena antidysenterica*	969	K. K. Bhutani, R. M. Vaid, M. Ali, R. Kapoor, S. R. Soodan and D. Kumar
Short Reports		
A germacrane-type sesquiterpene from the brown alga *Dictyopteris divaricata*	973	M. Segawa, K. Yamano and H. Shirahama
9-Deoxy drimane sesquiterpenes from *Canella winterana*	975	M. S. Al-Said, S. M. El-Khawaja, F. S. El-Feraly and C. D. Hufford
Oplopanes from the leaves of *Senecio mexicanus*	977	P. Joseph-Nathan, J. R. Villagómez, L. U. Román and J. D. Hernández

A mansonone from *Helicteres angustifolia* 980 C.-M. Chen, Z.-T. Chen and Y.-L. Hong

Manshurolide, a sesquiterpene lactone from *Aristolochia manshuriensis* 983 G. Rücker, C. W. Ming, R. Mayer, G. Will and A. Güllmann

Clerodane derivatives from *Platychaete aucheri* 985 A. Rustaiyan, Z. Habibi and C. Zdero

neo-Clerodane diterpenoids from *Teucrium pestalozzae*, *T. odontites* and *T. microphyllum* 988 M. C. de la Torre, M. Bruno, G. Savona, F. Piozzi, B. Rodríguez and O. Servettaz

Crystal structure of mozambioside, a diterpene glycoside of *Coffea pseudozanguebariae* 990 R. Prewo, A. Guggisberg, A. Lorenzi-Riatsch, T. W. Baumann and M. Wettstein-Bättig

16-Hydroxycarnosic acid, a diterpene from *Salvia apiana* 993 S. J. Dentali and J. J. Hoffmann

Cycloartane derivatives from *Garcinia lucida* 994 A.-M. Nyemba, T. N. Mpondo, J. D. Connolly and D. S. Rycroft

An anthraquinone derivative from *Dichotomophthora lutea* 997 T. Hosoe, K. Nozawa, S. Udagawa, S. Nakajima and K. Kawai

Revision of the structure and absolute configuration of cassialactone 999 S. Kitanaka, K. Ogata and M. Takido

Cirrhopetalin, a phenanthrene derivative from *Cirrhopetalum andersonii* 1002 P. L. Majumder and M. Basak

Chromone glycosides from *Schumanniophyton magnificum* 1004 P. Tane, J. F. Ayafor, B. L. Sondengam and J. D. Connolly

Chromone glucosides from rhubarb 1007 Y. Kashiwada, G. Nonaka and I. Nishioka

A chromene from *Hypericum japonicum* 1010 K. Ishiguro, M. Yamaki, M. Kashihara, S. Takagi and K. Isoi

6-Hydroxykaempferol 6,4′-dimethyl ether 3-galactoside from *Eupatorium glandulosum* 1011 A. G. R. Nair and R. Sivakumar

An acylated flavonol glycoside from *Lasiobema japonica* 1013 T. Iwagawa, J. Kawasaki, T. Hase, S. Sako, T. Ōkubo, M. Ishida and M. Kim

Two isoflavones from *Iris kashmiriana* 1014 P. K. Kachroo, T. K. Razdan, M. A. Qurishi, M. A. Khuroo, S. Koul and K. L. Dhar

Diterpenoid alkaloids from *Delphinium winklerianum* 1016 Y.-Z. Chen and A. Wu

A diphenylbisbenzylisoquinoline alkaloid from *Tiliacora racemosa* 1020 A. K. Ray, G. Mukhopadhyay, S. K. Mitra, K. P. Guha, B. Mukherjee, Atta-ur-Rahman and A. Nelofar

Stereochemical aspects of diphenylbisbenzylisoquinoline alkaloids from *Tiliacora racemosa* 1023 A. K. Ray, G. Mukhopadhyay, S. K. Mitra, B. Mukherjee, A. Nelofer and Atta-ur-Rahman

12,13-Dihydroxy-fumitremorgin C from *Aspergillus fumigatus* 1025 W.-R. Abraham and H.-A. Arfmann

Book Reviews

Biochemistry of the Algae and Cyanobacteria: edited by L. J. Rogers and J. G. Gallon 1027 J. B. Harborne

Economic and Medicinal Plant Research, Volume 3: edited by H. WAGNER, H. HIKINO and F. FARNSWORTH 1027 J. B. HARBORNE

Short Book Reviews 1028 J. B. HARBORNE

Number 4

Announcement 1029

Growth and Metabolism

A growth inhibitor, 3-(*E*)-(methylthio)methylene-2-pyrrolidine-thione from light-grown radish seedlings 1031 M. SAKODA, T. HASE and K. HASEGAWA

Measurement of xanthoxin in higher plant tissues using ^{13}C labelled internal standards 1033 A. D. PARRY, S. J. NEILL and R. HORGAN

New monoclonal antibodies to 3β-hydroxy-gibberellins 1041 J. E. NESTER-HUDSON, F. M. SEMENENKO, M. H. BEALE and J. MACMILLAN

Inhibition of nitrate and nitrite reductase activities by salinity stress in *Sorghum vulgare* 1047 R. KRISHNA RAO and A. GNANAM

Soluble and bound peroxidases from papaya fruit 1051 E. DA SILVA, E. J. LOURENÇO and V. A. NEVES

Purification and properties of sucrose-phosphate synthase from seeds of *Pisum sativum* 1057 J. E. LUNN and T. AP REES

Effect of phorone analogues on physiological disorders of apples 1065 R. B. H. WILLS and K. J. SCOTT

Soluble sugars from yam and changes during tuber storage 1069 B. KOUASSI, J. DIOPOH and B. FOURNET

Aliphatic and cyclic lipid components of *Sorghum* plant organs 1073 P. AVATO, G. BIANCHI and C. MURELLI

Seasonal fluctuation of triterpenoid constituents from dried leaflets of *Dryopteris crassirhizoma* 1079 K. SHIOJIMA, Y. ARAI and H. AGETA

Ecological Biochemistry

A reticuloendothelial system activating glycan from the rhizomes of *Curcuma longa* 1083 M. TOMODA, R. GONDA, N. SHIMIZU, M. KANARI and M. KIMURA

Cyclobrassinin sulphoxide, a sulphur-containing phytoalexin from *Brassica juncea* 1087 M. DEVYS, M. BARBIER, A. KOLLMANN, T. ROUXEL and J.-F. BOUSQUET

Stable blue complexes of anthocyanin-aluminium-3-*p*-coumaroyl- or 3-caffeoyl-quinic acid involved in the blueing of *Hydrangea* flower 1089 K. TAKEDA, T. YAMASHITA, A. TAKAHASHI and C. F. TIMBERLAKE

Antimicrobial phenolic compounds from three Spanish *Helichrysum* species 1093 F. TOMÁS-BARBERÁN, E. INIESTA-SANMARTÍN, F. TOMÁS-LORENTE and A. RUMBERO

The mechanism of co-pigmentation of anthocyanins in aqueous solutions 1097 G. MAZZA and R. BROUILLARD

Antifungal activity of flavonoids against storage fungi of the genus *Aspergillus* 1103 M. WEIDENBÖRNER, H. HINDORF, H. C. JHA and P. TSOTSONOS

Biosynthesis

Biosynthesis of the tropane-related cyanobacterial toxin anatoxin-*a*: role of ornithine decarboxylase 1107 J. R. GALLON, K. N. CHIT and E. G. BROWN

Elicitor induction and characterization of microsomal protopine-6-hydroxylase, the central enzyme in benzophenanthridine alkaloid biosynthesis — 1113 T. Tanahashi and M. H. Zenk

Cell Culture and Biotechnology

Polycation-like behaviour of chitosan on suspension-culture derived protoplasts of slash pine — 1123 M. S. Lesney

Ellagitannin formation in callus cultures of *Heterocentron roseum* — 1127 K. Yazaki and T. Okuda

Induction of two prenyltransferases for the accumulation of coumarin phytoalexins in elicitor-treated *Ammi majus* cell suspension cultures — 1131 D. Hamerski, D. Schmitt and U. Matern

Accumulation of coumarins in elicitor-treated cell suspension cultures of *Ammi majus* — 1137 D. Hamerski, R. C. Beier, R. E. Kneusel, U. Matern and K. Himmelspach

Chemotaxonomy

Electrophoretic forms of lysozyme activity in various plant species — 1143 P. Audy, D. Le Quéré, D. Leclerc and A. Asselin

Two diglycosyldiacylglycerol isomers in plant leaves, ferns, mosses and seaweeds — 1161 M. Kojima, H. Shiraki, M. Ohnishi and S. Ito

The volatiles of six *Teucrium* species from the Iberian Peninsula and the Balearic Islands — 1165 A. Velasco-Negueruela and M. J. Pérez-Alonso

Triterpene aglycones from various *Phytolacca dodecandra* populations — 1171 R. M. Parkhurst, D. W. Thomas, R. P. Adams, L. P. Makhubu, B. M. Mthupha, L. Wolde-Yohannes, E. Mamo, G. E. Heath, J. K. Stobaeus and W. O. Jones

Nonpolar flavonoids of *Wilkesia* and *Argyroxiphium* — 1175 B. A. Bohm and C. Fong

Plant Chemistry

Amygdalin acyl derivatives, cyanogenic glycosides from the seeds of *Merremia dissecta* — 1179 A. Nahrstedt, E. A. Sattar and S. M. H. El-Zalabani

The glucosinolates and aroma volatiles of green kohlrabi — 1183 G. MacLeod and A. J. MacLeod

A ligustilide dimer from *Angelica sinensis* — 1189 P. Hon, C. Lee, T. F. Choang, K. Chui and H. N. C. Wong

Composition of the gum from *Combretum paniculatum* and four other gums which are not permitted food additives — 1193 D. M. W. Anderson and W. Weiping

Volatile components of chayote — 1197 G. MacLeod

Volatile components of okra — 1201 J. M. Ames and G. MacLeod

Sesquiterpene lactones from *Vladimiria souliei* — 1209 R. X. Tan, J. Jakupovic, F. Bohlmann, Z. J. Jia and A. Schuster

Carvotacetone derivatives and eudesman-12,6β-olides from *Sphaeranthus* species — 1213 J. Jakupovic, M. Grenz, F. Bohlmann and G. M. Mungai

Guaianolides from *Kaunia lasiophthalma* — 1219 A. N. de Gutierrez, E. E. Sigstad, C. A. N. Catalán, A. B. Gutiérrez and W. Herz

Diterpenes from *Nardophyllum lanatum* — 1227 C. Zdero, F. Bohlmann and H. M. Niemeyer

Diterpenes and other constituents from *Pteronia* species — 1231 C. Zdero, J. Jakupovic and F. Bohlmann

ent-Halimane diterpenes from *Halimium viscosum* — 1247 J. G. Urones, I. Sánchez Marcos, Mª J. Sexmero Cuadrado, P. Basabe and A. M. Lithgow Bertelloni

Phlinosides A, B and C, three phenylpropanoid glycosides from *Phlomis linearis*	1253	İ. Çalış, A. A. Başaran, İ. Saracoğlu, O. Sticher and P. Rüedi
Blestrin A and B, bis(dihydrophenanthrene) ethers from *Bletilla striata*	1259	L. Bai, M. Yamaki, K. Inoue and S. Takagi
Schefflerin and isoschefflerin: prenylated chalcones and other constituents of *Uvaria scheffleri*	1261	M. H. H. Nkunya, H. Achenbach, C. Renner, R. Waibel and H. Weenen
Tri- and tetraoxygenated xanthones from *Swertia petiolata*	1265	K. S. Khetwal, B. Joshi and R. S. Bisht
Acetylated anthocyanins in *Zinnia elegans* flowers	1269	M. Yamaguchi, N. Terahara and K. Shizukuishi
^{13}C–^{1}H NMR long-range coupling and deuterium isotope effects of flavanones	1271	J. H. Jung and J. L. McLaughlin
Two flavonol glycosides from the underground parts of *Vancouveria hexandra*	1277	M. Mizuno, M. Iinuma, T. Tanaka, N. Sakakibara, J. Murata, H. Murata and F. A. Lang
Flavonol triglycosides from *Blackstonia peroliata*	1283	M. Kaouadji, A. Doucouré, A.-M. Mariotte, A. J. Chulia and F. Thomasson
Isoflavones from root bark of gorse	1287	G. B. Russell, H. Md. Sirat and O. R. W. Sutherland
Three steroidal alkaloids from *Buxus hildebrandtii*	1293	Atta-ur-Rahman, M. Alam, H. Nasir, E. Dagne and A. Yenesew
Esters of quinolizidine alkaloids from the genus *Pearsonia*	1297	G. H. Verdoorn and B.-E. van Wyk
Quinolinone alkaloids from an *Agathosma* species	1303	W. E. Campbell, B. Davidowitz and G. E. Jackson
Alkaloids from *Narcissus bicolor*	1307	F. Viladomat, J. Bastida, G. Tribo, C. Codina and M. Rubiralta

Short Reports

Aliphatic pentaamines found in *Canavalia gladiata*	1311	S. Matsuzaki, K. Hamana, M. Okada, M. Niitsu and K. Samejima
Occurrence of N^6-methylagmatine in seeds of leguminous plants	1313	S. Matsuzaki, K. Hamana and K. Isobe
An indole derivative and glucosinolates from *Moricandia arvensis*	1315	A. Belkhiri and G. B. Lockwood
A C_{18} conjugated tetraenoic acid from *Ixora chinensis* seed oil	1317	Huang Minquan
Manoyl oxide acid from resin of *Pinus sylvestris* needles	1320	R. Andersson, R. Gref and L. N. Lundgren
Irregular oxygenated monoterpenes from *Achillea fragrantissima*	1322	A. A. Ahmed, J. Jakupovic, A. A. Seif El-Din and F. R. Melek
Guaianolides from *Centaurea sinaica*	1324	H. S. Al-Easa, J. Mann and A.-F. Rizk
An A-ring contracted triterpenoid from *Hyptis suaveolens*	1326	K. V. Raja Rao, L. J. M. Rao and N. S. Prakasa Rao

Perseapicroside A, hexanorcucurbitacin-type glucopyranoside from *Persea mexicana*	1330	A. Ohsaki, T. Kubota and Y. Asaka
Two furostane sapogenins from *Cordyline rubra*	1332	M. Yang, G. Blunden, A. Patel, T. A. Crabb, K. Brain and W. J. Griffin
A (+)-catechin digalloyl ester from the bark of *Acacia gerrardii*	1334	E. Malan
Lignans from *Juniperus sabina*	1335	A. San Feliciano, J. M. Miguel del Corral, M. Gordaliza and A. Castro
C-Glycosylflavones from *Galipea trifoliata*	1339	A. Bakhtiar, J. Gleye, C. Moulis, I. Fouraste and E. Stanislas
Flavonoids from *Leptospermum scoparium*	1340	R. Mayer
Acylated flavonoid aglycones from *Gnaphalium robustum*	1342	A. Urzua and P. Cuadra
An acylated isorhamnetin glycoside from *Aerva javanica*	1344	N. A. M. Saleh, R. M. A. Mansour and K. R. Markham
Flavonol diglycosides from *Blackstonia perfoliata*	1345	M. Kaouadji
Further non-polar flavonols from *Platanus acerifolia* buds	1348	M. Kaouadji and P. Ravanel
Tectochrysin 5- and genistein 5-glucosides from the bark of *Prunus cerasus*	1351	M. Geibel, H. Geiger and D. Treutter
Alkaloids and triterpenoids of *Lobelia davidii*	1353	M.-Z. Zhang, J.-C. Wang and S.-H. Zhou
Indole alkaloids from *Aristotelia chilensis*	1354	C. Cespedes, J. Jakupovic, M. Silva and W. Watson
X-Ray crystal structure of the hydrochloride of 6-epicastanospermine [(1*S*,6*R*,7*R*,8*R*,8a*R*)-1,6,7,8-tetrahydroxyoctahydroindolizine]	1356	R. J. Nash, L. E. Fellows, A. Girdhar, G. W. J. Fleet, J. M. Peach, D. J. Watkin and M. P. Hegarty

Number 5

Announcement	vii	
Review Article Number 52 Chemical and ethological studies of pollination in the genus *Ophrys* (Orchidaceae)	1359	A.-K. Borg-Karlson
Growth and Metabolism Sunflower 11S globulin, susceptibility to proteolytic cleavage of the subunits of native helianthinin during isolation: HPLC fractionation of the subunits	1389	A. A. Kortt and J. B. Caldwell
Plasma membrane bound high pI peroxidase isoenzymes convert tryptophan to indole-3-acetaldoxime	1397	J. Ludwig-Müller, T. Rausch, S. Lang and W. Hilgenberg
3-Hydroxy-3-methylglutaryl coenzyme A reductase from the latex of *Hevea brasiliensis*	1401	R. Wititsuwannakul, D. Wititsuwannakul and P. Suwanmanee
Purification and partial characterization of milk clotting proteases from flowers of *Cynara cardunculus*	1405	U. Heimgartner, M. Pietrzak, R. Geertsen, P. Brodelius, A. C. da Silva Figueiredo and M. S. S. Pais

Apyrase activity and changes in metabolites during germination and tuberization of *Solanum tuberosum*	1411	M. Anich, N. Fanta, M. Mancilla, A. M. Kettlun, M. A. Valenzuela and A. Traverso-Cori
Characterization of β-amylase from *Sinapis alba* cotyledons	1417	K. Subbaramaiah and R. Sharma
Determination of rhodanese in plants	1421	R. Lieberei and D. Selmar
Purification and properties of 3′-phosphoadenosine-5′-phosphosulphate: desulphoglucosinolate sulphotransferase from *Brassica juncea* cell cultures	1425	J. C. Jain, J. W. D. GrootWassink, A. D. Kolenovsky and E. W. Underhill
Reaction of DIMBOA, a resistance factor from cereals, with α-chymotrypsin	1429	L. Cuevas, H. M. Niemeyer and F. J. Pérez
Galactolipids from the temperate red marine alga *Gracilariopsis lemaneiformis*	1433	Z. D. Jiang and W. H. Gerwick
Lipid and fatty acid changes during germination of alfalfa seeds	1441	L.-S. Huang and C. Grunwald
Effects of temperature, light and a chemical modulator on linolenate biosynthesis in mutant and wild type *Arabidopsis* calli	1447	J. A. Brockman, H. A. Norman and D. F. Hildebrand
Diamine oxidation and alkaloid production in transformed root cultures of *Nicotiana tabacum*	1455	N. J. Walton and W. R. McLauchlan
Ecological Biochemistry		
Lectin-binding proteins from lentil seeds as mitogens for murine B lymphocytes	1459	T. C. Freier and H. E. F. Rüdiger
Analysis of monoterpenes emitted and absorbed by undamaged boles of lodgepole pine	1463	D. F. Rhoades
Sesquiterpene lactones with antibacterial activity from *Tanacetum argyrophyllum* var. *argyrophyllum*	1467	N. Gören, J. Jakupovic and S. Topal
Structure–activity relationships of the eremophilanes produced by *Drechslera gigantea*	1471	G. Bunkers, D. Kenfield, G. Strobel and F. Sugawara
The sesquiterpenoid carcinogen of bracken fern, and some analogues, from the Pteridaceae	1475	K. Saito, T. Nagao, S. Takatsuki, K. Koyama and S. Natori
Sesquiterpenoid esters from the fruits of *Ferula communis*	1481	G. Appendino, S. Tagliapietra, L. Paglino, G. M. Nano, D. Monti and V. Picci
Antifungal diterpenic esters from the mushroom *Boletinus cavipes*	1485	M. Toyota and K. Hostettmann
Isolation of β-phenyllactic acid related compounds from *Pseudomonas syringae*	1491	A. Evidente, N. S. Iacobellis, A. Scopa and G. Surico
4-Methoxybrassinin, a sulphur-containing phytoalexin from *Brassica oleracea*	1499	K. Monde, K. Sasaki, A. Shirata and M. Takasugi
Role of stilbenes in the natural durability of wood: fungicidal structure–activity relationships	1501	T. P. Schultz, T. F. Hubbard, Jr, L. Jin, T. H. Fisher and D. D. Nicholas
Production of alterporriols, altersolanols and macrosporin by *Alternaria porri* and *A. solani*	1509	R. Suemitsu, K. Horiuchi, M. Kubota and T. Okamatsu
Membrane-disrupting properties of the steroidal glycoalkaloids solasonine and solamargine	1513	J. G. Roddick, A. L. Rijnenberg and M. Weissenberg
Biosynthesis		
Stereospecificity of hydrogen transfer by fungal and plant NADPH:isoflavone oxidoreductases	1519	D. Schlieper, K. Tiemann and W. Barz

Biosynthesis of triacylglycerols containing very long chain monounsaturated fatty acids in seeds of *Lunaria annua* 1525 E. Fehling and K. D. Mukherjee

Biosynthetic origin of (8*R*,9*S*)-9,10-epoxy-8-hydroxy-9-methyldeca-(2*E*,4*Z*,6*E*)-trienoic acid, a precursor of AK-toxins produced by *Alternaria alternata* 1529 S. Nakatsuka, B. Feng, T. Goto, T. Tsuge and S. Nishimura

Biosynthesis of naringin in *Citrus paradisi*: UDP-glucosyltransferase activity in grapefruit seedlings 1533 C. A. McIntosh and R. L. Mansell

Cell Culture and Biotechnology

Phytochrome in control of differentiation and phosphatidylinositol turnover in *Brassica oleracea* cultures 1539 A. Basu, U. Sethi and S. Guha-Mukherjee

Effect of ferulic and β-fluoroferulic isopropylamine salts on solid and liquid cultures of carnation 1543 C. Kevers, T. Gaspar, C. Lapierre, D. Jouin, B. Monties, C. Francesch, C. Rolando, R. Goldberg and A.-M. Catesson

Stimulation of ascorbate oxidase secretion from cultured pumpkin cells by Eosine Yellowish and potassium salicylate 1547 M. Esaka, K. Suzuki and K. Kubota

Cyclodextrin-facilitated bioconversion of 17β-estradiol by a phenoloxidase from *Mucuna pruriens* cell cultures 1551 H. J. Woerdenbag, N. Pras, H. W. Frijlink, C. F. Lerk and T. M. Malingré

Glucosylation of isomeric hydroxybenzoic acids by cell suspension cultures of *Mallotus japonicus* 1555 S. Tanaka, K. Hayakawa, Y. Umetani and M. Tabata

Condensed tannin production in callus and suspension cultures of *Cinnamomum cassia* 1559 K. Yazaki and T. Okuda

Amarogentin, amaroswerin and four xanthones from hairy root cultures of *Swertia japonica* 1563 K. Ishimaru, H. Sudo, M. Satake, Y. Matsunaga, Y. Hasegawa, S. Takemoto and K. Shimomura

Scopolamine radioimmunoassay for tissue cultures of *Datura* 1567 B. J. Savary and D. K. Dougall

Chemotaxonomy

Chemosystematics of surface lipids from maize and some related species 1571 P. Avato, G. Bianchi and N. Pogna

ent-Sesquiterpenoids and cyclic bis(bibenzyls) from the German liverwort *Marchantia polymorpha* 1577 Y. Asakawa, M. Tori, T. Masuya and J.-P. Frahm

Guaianolides and glaucolides from *Ajania achilleoides* 1585 C. Zdero, F. Bohlmann and S. Huneck

12β-Hydroxyabieta-7,13-diene and other constituents from east African *Helichrysum* species 1589 J. Jakupovic, M. Grenz, F. Bohlmann and G. M. Mungai

Plant Chemistry

Monoterpene glucosides having a cross conjugated dienone system from *Spiraea cantoniensis* 1591 Y. Takeda, K. Fukumoto, M. Tachibana, T. Shingu, T. Fujita and T. Ichihara

Two germacrane sesquiterpenes from *Pulicaria glutinosa* 1595 J. S. Mossa, M. A. Al-Yahya, M. S. Hifnawy, A. A. Shehata, F. S. El-Feraly, C. D. Hufford, D. R. McPhail and A. T. McPhail

Sesquiterpene lactone aglycones and glycosides from *Hymenoxys lemmonii* 1601 F. Gao, H. Wang and T. J. Mabry

Diterpenes from *Zuelania guidonia* 1609 M. R. Khan, A. I. Gray, D. R. Reed, I. H. Sadler and P. G. Waterman

An ingenane diterpene from Belizian *Mabea excelsa* 1615 G. Brooks, A. T. Evans, D. P. Markby, M. E. Harrison, M. A. Baldwin and F. J. Evans

Bitter kaurane-type diterpene glucosides from the liverwort *Jungermannia infusca* 1619 F. Nagashima, M. Toyota and Y. Asakawa

Constituents of the latex of *Euphorbia antiquorum* 1625 M. B. Gewali, M. Hattori, Y. Tezuka, T. Kikuchi and T. Namba

Lanost-7-en triterpenes from stem bark of *Santiria trimera* 1629 M. F. das G. F. da Silva, R. H. P. Francisco, A. I. Gray, J. R. Lechat and P. G. Waterman

Minor cucurbitacin glycosides from *Picrorhiza kurrooa* 1633 H. Stuppner, H. Kählig, O. Seligmann and H. Wagner

24,24-Dimethyl-25-dehydrolophenol, a 4α-methylsterol from *Clerodendrum inerme* 1939 T. Akihisa, P. Ghosh, S. Thakur, H. Nagata, T. Tamura and T. Matsumoto

Isomeric F-ring dihydroxylated 22,25-epoxyfurostene and spirostene sapogenins from *Tacca leontopetaloides* 1643 A. Abdel-Aziz, K. Brain, G. Blunden, T. Crabb and A. K. Bashir

4α,14α-Dimethyl-5α-ergosta-7,9(11),24(28)-trien-3β-ol from *Phaseolus vulgaris* and *Gynostemma pentaphyllum* 1647 T. Akihisa, W. C. M. C. Kokke, T. Yokota, T. Tamura and T. Matsumoto

Phenolic compounds from roots of *Urtica dioica* 1653 R. Kraus and G. Spiteller

Three piperazinediones and a drimane diterpenoid from *Penicillium brevi-compactum* 1661 W. A. Ayer, I. van Altena and L. M. Browne

Bioactive constituents of *Melodorum fruticosum* 1667 J. H. Jung, S. Pummangura, C. Chaichantipyuth, C. Patarapanich and J. L. McLaughlin

Thiolysis of birch bark procyanidins: structural dependence in formation of 2,3-*cis*-3,4-*cis*-flavan-4-benzylthioethers from procyanidins 1671 H. Kolodziej

Flavanone xyloside and lignans from *Prunus jamasakura* bark 1675 K. Yoshinari, N. Shimazaki, Y. Sashida and Y. Mimaki

An external flavonoid and its dimer from the fern *Oreopteris quelpaertensis* 1679 K. Hori, T. Satake, Y. Saiki, K. Kobayashi, J. Uzawa, Y. Fujimoto and T. Murakami

Alkaloids of *Heimia montana* 1683 A. Rother

Short Reports

Secoiridoid glucosides from *Gentiana campestris* 1687 E. M. Mpondo, J. Garcia and A. J. Chulia

Eudesmanolides from *Stevia aff. tomentosum* 1689 M. Martínez-Vázquez, R. E. Gallegos and P. Joseph-Nathan

Terpenoids from *Salvia mellifera* 1691 A. G. González, L. S. Andrés, A. G. Ravelo, J. G. Luis, I. L. Bazzocchi and J. West

A triterpenoid lactone from *Leucas aspera* 1693 B. P. Pradhan, D. K. Chakraborty and G. C. Subba

Terpenoid glycosides from *Ophiopogon japonicus* roots 1696 M. Adinolfi, M. Parrilli and Y. Zhu

A degraded limonoid from *Fagaropsis glabra* 1699 J. Boustie, C. Moulis, J. Gleye, I. Fouraste, P. Servin and M. Bon

(+)-Isoaltholactone: a furanopyrone isolated from *Goniothalamus* species 1701 S. M. Colegate, L. B. Din, A. Latiff, K. M. Salleh, M. W. Samsudin, B. W. Skelton, K. Tadano, A. H. White and Z. Zakaria

Monoterpenoid phloroacetophenones from *Euodia latifolia* 1704 S. H. Goh, V. C. Chung, C. K. Sha and T. C. W. Mak

Two flavonol glycosides from *Lysimachia nummularia* 1707 K. Yasukawa, H. Ogawa and M. Takido

Rotenoids from *Boerhaavia repens* 1709 M. Ahmed, B. K. Datta and A. S. S. Rouf

Ismine and related alkaloids from *Lapiedra martinezii* 1710 R. Suau, A. I. Gómez and R. Rico

Number 6

Obituary
Holger Erdtman 1902–1989 1713 T. Norin

Review Article Number 53
Phytochemicals: differentiation and function 1715 O. R. Gottlieb

Growth and Metabolism
In vivo spectroscopic evidence of ethylene-induced chlorophyll degradation 1725 K. Shimokawa

Xenobiotic metabolism in plants: aryl hydroxylation of diclofop by a cytochrome P-450 enzyme from wheat 1729 A. Zimmerlin and F. Durst

Interaction of auxin with dibasic amino acids 1733 T. Cserháti and M. Szögyi

A plant growth regulator produced by the fungus, *Cochliobolus spicifer* 1739 H. Nakajima, T. Hamasaki, S. Maeta, Y. Kimura and Y. Takeuchi

Isolation and characterization of a lectin from the seeds of *Dioclea lehmanni* 1745 G. Perez, M. Hernandez and E. Mora

Oxidation kinetics of *trans*-caffeoyltartrate and its glutathione derivatives in grape musts 1751 V. Cheynier, J. Rigaud and M. Moutounet

Hevea calmodulin: regulation of the activity of latex 3-hydroxy-3-methylglutaryl coenzyme A reductase 1755 R. Wititsuwannakul, D. Wititsuwannakul and S. Dumkong

Effect of enzyme-activated inhibitors on ornithine decarboxylase and growth of *Botrytis cinerea* 1759 T. A. Smith, J. H. A. Barker and M. Jung

Purification and characterization of a protease from jackfruit latex 1763 K. M. Renuka Prasad and T. K. Virupaksha

Effect of acid rain on polyamines in *Picea* 1767 A. Santerre, M. Markiewicz and V. R. Villanueva

Microbiological transformations of hecogenin and diosgenin by *Cunninghamella elegans* 1771 G. Blunden, A. V. Patel and T. A. Crabb

Catabolism of gramine in *Hordeum vulgare* 1781 A. A. Ghini, G. Burton and E. G. Gros

Ecological Biochemistry

D-1-*O*-Methyl-*muco*-inositol in *Viscum album* and members of the Rhizophoraceae — 1785 — A. Richter, B. Thonke and M. Popp

A prenylated benzoic acid derivative from the leaves of *Piper taboganum* — 1787 — V. Roussis, S. A. Ampofo and D. F. Wiemer

Stress effects on cotton leaf phytoalexins elicited by cell-free-mycelia extracts of *Aspergillus flavus* — 1789 — H. J. Zeringue, Jr

Neo-clerodane insect antifeedants from *Scutellaria galericulata* — 1793 — M. D. Cole, J. C. Anderson, W. M. Blaney, L. E. Fellows, S. V. Ley, R. N. Sheppard and M. S. J. Simmonds

(20*S*)-4α-Methyl-24-methylenecholest-7-en-3β-ol, an allelopathic sterol from *Typha latifolia* — 1797 — M. Della Greca, L. Mangoni, A. Molinaro, P. Monaco and L. Previtera

Lignoids and arylalkanones from fruits of *Virola elongata* — 1799 — M. J. Kato, M. Yoshida and O. R. Gottlieb

Uptake of host plant alkaloids by root parasitic *Pedicularis* species — 1811 — M. J. Schneider and F. R. Stermitz

Biosynthesis

Fatty acid incorporation in the biosynthesis of anacardic acids of geraniums — 1815 — D. S. Walters, R. Craig and R. O. Mumma

Deuterium labelling of *ent*-kaur-16-en-19-oic acid at carbon-6 and -7 — 1823 — S. J. Castellaro, S. C. Dolan, J. MacMillan and C. L. Willis

Stereochemistry of the metabolic steps from kaurenoic acids to kaurenolides and gibberellins — 1833 — S. J. Castellaro, S. C. Dolan, P. Hedden, P. Gaskin and J. MacMillan

Biosynthesis of lignans in *Forsythia intermedia* — 1841 — M. M. A. Rahman, P. M. Dewick, D. E. Jackson and J. A. Lucas

Biosynthesis of nicotine and scopolamine in a root culture of *Duboisia leichhardtii* — 1847 — E. Leete, T. Endo and Y. Yamada

Cell Culture and Biotechnology

The sesquiterpene lactone dihydroleucodin in tissue culture from *Artemisia douglasiana* — 1853 — L. J. Pestchanker, A. M. Giulietti, M. J. Pestchanker, E. Guerreiro and O. S. Giordano

Free triterpenols and sterols produced by *in vitro* cultures and laticifer cells from *Euphorbia characias* — 1855 — M. Fernandes-Ferreira, J. M. Novais and M. S. S. Pais

Production of lignans in *Forsythia intermedia* cell cultures — 1861 — M. M. A. Rahman, P. M. Dewick, D. E. Jackson and J. A. Lucas

Metabolic fate of cinnamic acid in elicitor treated cell suspension cultures of *Phaseolus vulgaris* — 1867 — R. Edwards, M. Mavandad and R. A. Dixon

Chemotaxonomy

Carbohydrate composition and characterization of sugars from the green microalga *Botryococcus braunii* — 1875 — B. Allard and E. Casadevall

Proteases from the sarcocarp of yellow snake-gourd — 1879 — T. Uchikoba, H. Horita and M. Kaneda

Chemical diversity of the contents from the secretory structures of *Heracleum sphondylium* subsp. *sphondylium* — 1883 — C. Bicchi, A. D'Amato, C. Frattini, E. M. Cappelletti, R. Caniato and R. Filippini

Variations in leaf terpenoids with ploidy level in citrus cultivars and hybrids — 1889 — K. Ogihara, K. Munesada and T. Suga

Xanthones from *Bonnetia dinizii* 1893 W. G. DE OLIVEIRA, A. A. L. MESQUITA, K. KUBITZKI and O. R. GOTTLIEB

Alkaloids of *Thalictrum delavayi* 1895 C. GAO, Y. E. ALI, M. SHARAF, L. K. WONG, E. W. FU, F. LIN, F. K. DUAH and P. L. SCHIFF, JR

Aporphinoid alkaloids of *Guatteria oliviformis* and *G. tonduzii* 1899 J. A. LÓPEZ, J. G. LAURITO, A. M. BRENES, F. LIN, M. SHARAF, L. K. WONG and P. L. SCHIFF, JR

Plant Chemistry

Structure elucidation of an acylated cyanogenic triglycoside, and further cyanogenic constituents from *Xeranthemum cylindraceum* 1903 P. SCHWIND, V. WRAY and A. NAHRSTEDT

Monoterpenoids from *Radermachia sinica* 1913 T. IWAGAWA, H. ASAI, T. HASE, S. SAKO, R. SU, N. HAGIWARA and M. KIM

Iridoid glucosides from *Nyctanthes arbor-tristis* 1917 A. RATHORE, V. SRIVASTAVA, K. C. SRIVASTAVA and J. S. TANDON

Gymnomitrane sesquiterpenoids from the liverwort *Marsupella emarginata* var. *patens* 1921 A. MATSUO, H. NOZAKI, K. YANO, S. UTO, M. NAKAYAMA and S. HUNECK

ent-Atisane diterpenes from *Euphorbia fidjiana* 1925 A. R. LAL, R. C. CAMBIE, P. S. RUTLEDGE and P. D. WOODGATE

ent-Kauranes from *Helianthus atrorubens* 1937 A. B. GUTIÉRREZ and W. HERZ

Astrailienin A from *Astragalus iliensis* 1941 C. YU-QUN, A. GULI and L. YONG-RONG

Triterpenoid saponins from *Centipeda minima* 1945 D. GUPTA and J. SINGH

Four annonins from *Annona squamosa* 1951 M. NONFON, F. LIEB, H. MOESCHLER and D. WENDISCH

Meroterpenoid naphthoquinones from *Cordia corymbosa* 1955 L. W. BIEBER, I. MESSANA, S. C. N. LINS, Á. A. DA SILVA FILHO, A. A. CHIAPPETA and J. F. DE MÉLLO

Cardiac glycosides of *Beaumontia brevituba* and *B. murtonii* 1961 T. YAMAUCHI, F. ABE and T. SANTISUK

N-Δ^{13}-Docosenoylanthranilic acid and alkylresorcinols from *Ononis natrix* subsp. *hispanica* 1967 A. F. BARRERO, J. F. SÁNCHEZ and I. RODRÍGUEZ

Lignans of *Forsythia intermedia* 1971 M. M. A. RAHMAN, P. M. DEWICK, D. E. JACKSON and J. A. LUCAS

Three lignans from *Bupleurum salicifolium* 1981 A. G. GONZÁLEZ, R. ESTÉVEZ-REYES, C. MATO and A. Mª ESTÉVEZ-BRAUN

Lignans and other constituents of *Knema furfuracea* 1985 M. M. M. PINTO, A. KIJJOA, I. MONDRANONDRA, A. B. GUTIÉRREZ and W. HERZ

Neolignan glycosides from roots of *Codonopsis tangshen* 1989 M. YUDA, K. OHTANI, K. MIZUTANI, R. KASAI, O. TANAKA, M. JIA, Y. LING, X. PU and Y. SARUWATARI

Cyclic farnesyl-coumarin and farnesyl-chromone derivatives from *Ferula communis* subsp. *communis* 1995 M. MISKI and J. JAKUPOVIC

Feruloylated xyloglucan and *p*-coumaroyl arabinoxylan oligosaccharides from bamboo shoot cell-walls	1999	T. Ishii, T. Hiroi and J. R. Thomas
Isoflavonoids and a cinnamyl phenol from root extracts of *Erythrina variegata*	2005	H. Telikepalli, S. R. Gollapudi, A. Keshavarz-Shokri, L. Velazquez, R. A. Sandmann, E. A. Veliz, K. V. Jagannadha Rao, A. Siva Madhavi and L. A. Mitscher
Isoflavan-4-ol, dihydrochalcone and chalcone derivatives from *Polygonum lapathifolium*	2009	M. Ahmed, M. Khaleduzzaman and M. S. Islam
Isoflavonoids from *Salsola somalensis*	2013	Y. Woldu and B. Abegaz
Short Reports		
An imide from the pods of *Butea monosperma*	2017	P. K. Guha, R. Poi and A. Bhattacharyya
Anthraquinone glycosides from *Rhamnus libanoticus*	2018	M. Coşkun, T. Satake, K. Hori, Y. Saiki and M. Tanker
Deoxyelephantopin and 2-epideoxyelephantopin analogues from *Gochnatia palosanto*	2020	M. I. Ybarra, C. A. N. Catalán, E. Guerreiro, A. B. Gutíerrez and W. Herz
Lathyrane diterpenes from *Euphorbia lathyris*	2025	H. Itokawa, Y. Ichihara, M. Yahagi, K. Watanabe and K. Takeya
A triterpenoid from *Pristimera grahamii*	2027	R. Bhima Rao, E. Sukumar, A. B. Kundu and A. Patra
An hydroxy diketosteroid from the marine red alga *Hypnea musciformis*	2029	J. M. Babu, H. H. Mathur and G. K. Trivedi
Saponins from *Oxytropis glabra*	2032	R.-Q. Sun and Z.-J. Jia
A dihydrobenzofuran from Indian dill seed oil	2035	A. Ahmad, L. N. Misra and M. C. Nigam
Secondary metabolites from *Hintonia latiflora*	2037	R. Mata, M. del Rayo Camacho, E. Cervera, R. Bye and E. Linares
Cassinopin, a kaempferol trirhamnoside from *Cassinopsis madagascariensis*	2040	P. Rasoanaivo, S. Ratsimamanga-Urverg, I. Messana, Y. De Vicente and C. Galeffi
3-Hydroxy-4′-methoxyflavone from *Miliettia zechiana*	2043	M. Parvez and O. N. Ogbeide
Alkaloids from *Corydalis*	2044	C. Ito, T. Mizuno, T.-S. Wu and H. Furukawa
Book Reviews		
A Dictionary of Plant Pathology: Paul Holliday	2047	J. R. Coley-Smith
Molecular Biology: edited by A. Marcus	2047	J. Tempé
Plant Molecular Biology Manual: edited by S. B. Gelvin, R. A. Schilperoort and D. P. S. Verma	2048	G. P. Bolwell
Studies in Natural Product Chemistry, Volume 3, Stereoselective Synthesis (Part B): edited by Atta-ur-Rahman	2048	J. R. Hanson
Chemistry and Biology of Naturally-Occurring Acetylenes and Related Compounds: edited by J. Lam, H. Breteler, T. Arnason and L. Hansen	2049	J. Mann

Short Book Reviews 2049 J. B. HARBORNE

Corrigenda 2051

Number 7

Announcement ix

Review Article Number 54
3-Isoprenylcoumarins 2053 R. H. GALÁN, G. M. MASSANET, F. R. LUIS and J. SALVÁ

Growth and Metabolism
Cytokinins from marine organisms 2061 A. H. A. FAROOQI, Y. N. SHUKLA, A. SHUKLA and D. S. BHAKUNI

The absolute configuration effect on the activity of the avocado rooting promoter 2065 D. BECKER, Y. SAHALI and M. RAVIV

The peroxisomal dienoyl-CoA reductase pathway in pineapple fruit 2069 R. G. BERGER, G. R. DETTWEILER, H. KOLLMANNSBERGER and F. DRAWERT

Two groups of intracellular α-amylase isoenzymes from cultured rice cells 2075 Y. CHIBA, M. UI, Y. KATO, T. NAKAJIMA and E. ICHISHIMA

Multiple forms of β-galactosidase from the germinating seeds of *Vigna radiata* 2079 R. K. KUNDU, P. DE-KUNDU and A. C. BANERJEE

Soluble and wall associated forms of invertase in *Vitis vinifera* 2083 H. P. RUFFNER, S. ADLER and D. M. RAST

Multiple forms of invertase from *Daucus carota* cell cultures 2087 J. R. STOMMEL and P. W. SIMON

Changes in molecular species of glycerolipids from developing *Vigna angularis* seeds 2091 M. KOJIMA, S. SASAKI, M. OHNISHI, Y. MANO and S. ITO

Surface waxes from leaves and fruits of walnut 2097 R. B. N. PRASAD and P.-G. GÜLZ

Epicuticular waxes from leaves of *Quercus robur* 2101 R. B. N. PRASAD, E. MÜLLER and P.-G. GÜLZ

Pyropheophorbide *a*, a catabolite of ethylene-induced chlorophyll *a* degradation 2105 K. SHIMOKAWA, A. HASHIZUME and Y. SHIOI

Effect of hydroxylated and methoxylated coumarins on the regulatory properties of phenylalanine ammonia-lyase from *Citrus sinensis* 2107 I. A. DUBERY

Monoclonal antibodies to bis-indole alkaloids of *Catharanthus roseus* and their use in enzyme-linked immuno-sorbent-assays 2109 M. C. CIBOTTI, C. FREIER, J. ANDRIEUX, M. PLAT, L. COSSON and C. BOHUON

Ecological Biochemistry
Sucrose esters associated with glandular trichomes of wild *Lycopersicon* species 2115 R. R. KING, L. A. CALHOUN, R. P. SINGH and A. BOUCHER

Lipids of soybean and sunflower seedlings grown under drought conditions 2119 F. NAVARI-IZZO, N. VANGIONI and M. F. QUARTACCI

Tropane derivatives from *Calystegia sepium* 2125 A. GOLDMANN, M.-L. MILAT, P.-H. DUCROT, J.-Y. LALLEMAND, M. MAILLE, A. LEPINGLE, I. CHARPIN and D. TEPFER

Biosynthesis
Biosynthesis of artemisinic acid in *Artemisia annua* 2129 A. AKHILA, K. RANI and R. S. THAKUR

The biosynthesis of dihydrogladiolic acid by *Penicillium gladioli* 2133 A. G. Avent, J. R. Hanson and A. Truneh

Accumulation and biosynthesis of the chromenes precocene I and II in *Ageratum houstonianum* 2135 R. Siebertz, P. Proksch and L. Witte

Cell Culture and Biotechnology

Hydroxamic acids accumulation by wheat callus 2139 G. E. Zúñiga, S. V. Copaja, H. R. Bravo and V. H. Argandoña

Biotransformation of linalyl acetate by suspension cultures of *Papaver bracteatum* 2143 I. Hook, R. Lecky, B. McKenna and H. Sheridan

Accumulation of the anti-fungal diterpene sclareol by cell cultures of *Salvia sclarea* and *Nicotiana glutinosa* 2145 D. V. Banthorpe, J. T. Brown and G. S. Morris

Biotransformation of 18β-glycyrrhetinic acid by cell suspension cultures of *Glycyrrhiza glabra* 2149 H. Hayashi, H. Fukui and M. Tabata

Anthocyanins in cell cultures of *Ajuga reptans* 2153 A. Callebaut, G. Hendrickx, A. M. Voets and J. C. Motte

Chemotaxonomy

2-Amino-4*N*-ureidopropionic acid (albizzine) and its oxalyl derivative in hyphae of *Coniophora puteana* 2159 C. S. Evans, P. J. Burns, M. Dutton and S. Brown

Cyclopentyl and ω-5 monounsaturated fatty acids from red algae of the Solieriaceae 2161 J. Miralles, M. Aknin, L. Micouin, E. Gaydou and J.-M. Kornprobst

Sacculatane- and clerodane-type diterpenoids from the liverworts *Porella perrottetiana* and *Heteroscyphus bescherellei* 2165 Y. Asakawa, M. Toyota and A. Ueda

Terpenoids from some Japanese liverworts 2169 F. Nagashima, M. Toyota and Y. Asakawa

Distribution of betacyanins and hydroxycinnamic acid-glucose esters in flowers of the Ruschieae 2175 D. Strack, N. Marxen, H. Reznik and H.-D. Ihlenfeld

Glycerol derivatives and other constituents from *Metalasia* species 2179 C. Zdero and F. Bohlmann

Flavonoid chemistry of *Siphonoglossa* 2181 R. A. Hilsenbeck and T. J. Mabry

Plant Chemistry

Direct relationship between the resistant biopolymer and the tetraterpenic hydrocarbon in the lycopadiene race of *Botryococcus braunii* 2187 S. Derenne, C. Largeau, E. Casadevall and N. Sellier

Volatile compounds and long-chain aldehydes formation in conchocelis-filaments of a red alga, *Porphyra tenera* 2193 T. Kajiwara, M. Kashibe, K. Matsui and A. Hatanaka

ent-Eudesmane-type sesquiterpenoids from *Bazzania* species 2197 K. Kondo, M. Toyota and Y. Asakawa

Structures of sesquiterpenes from *Curcuma longa* 2201 M. Ohshiro, M. Kuroyanagi and A. Ueno

Eremophilenolides from *Hertia cheirifolia* 2207 G. Massiot, J.-M. Nuzillard, L. Le Men-Olivier, P. Aclinou, A. Benkouider and A. Khelifa

Sesquiterpene lactones from *Xanthium pungens* 2211 A. A. Ahmed, J. Jakupovic, F. Bohlmann, H. A. Regaila and A. M. Ahmed

Sesqui- and diterpenes from *Baccharis* species 2217 J. Jakupovic, A. Schuster, U. Ganzer, F. Bohlmann and P. E. Boldt

Terpenoid compounds from *Parentucellia latifolia*	2223	J. G. Urones, I. S. Marcos, L. Cubillo, N. M. Garrido and P. Basabe
Two C-10 oxygenated *neo*-clerodane diterpenoids from *Teucrium pestalozzae*	2229	M. C. de la Torre, B. Rodríguez, M. Bruno, G. Savona, F. Piozzi, A. Perales, M. R. Torres and O. Servettaz
Daphnane diterpenes of *Thymelaea hirsuta*	2235	G. Brooks, A. T. Evans, A. Aitken, F. J. Evans, A.-F. M. Rizk, F. M. Hammouda, M. M. El-Missiry and S. E. Ismail
ent-Pimarane and *ent*-abietane diterpenes from *Euphorbia fidjiana*	2239	A. R. Lal, R. C. Cambie, P. S. Rutledge and P. D. Woodgate
seco-Clerodanes and other diterpenes from *Conyza welwitschii*	2247	C. Zdero, F. Bohlmann and G. M. Mungai
17β,21β-Epoxyhopan-3β-ol and β-alnincanol from *Euphorbia supina*	2253	R. Tanaka, M. Kurimoto, M. Yoneda and S. Matsunaga
A *nor*-triterpenoid from *Lophanthera lactescens*	2257	H. dos S. Abreu, R. Braz Fo, H. E. Gottlieb and J. N. Shoolery
4,4,24-Trimethylcholesta-8,14,24(28)-trien-2α,3β,11α,12β-tetrol 12-acetate, 3-sulphate from *Fusarium graminearum*	2263	R. F. Vesonder, H. R. Burmeister and L. W. Tjarks
Steroidal saponins from the bulbs of *Lilium brownii*	2267	Y. Mimaki and Y. Sashida
Inositol derivatives and pseudoguaianolides from *Hymenoxys texana*	2273	F. Gao, H. Wang and T. J. Mabry
Applications of negative fast atom bombardment and MS/MS to screening of lichen compounds	2277	G. Holzmann and C. Leuckert
Benzylphenanthrenes from *Bletilla striata*	2285	M. Yamaki, L. Bai, K. Inoue and S. Takagi
Structure of the chalcone dimers lophirone F, G and H from *Lophira lanceolata* stem bark	2289	R. Ghogomu Tih, B. L. Sondengam, M. T. Martin and B. Bodo
Acylated and non-acylated kaempferol monoglycosides from *Platanus acerifolia* buds	2295	M. Kaouadji
Isocoumarin from *Paepalanthus bromelioides*	2299	W. Vilegas, N. F. Roque, A. Salatino, A. M. Giesbrecht and S. Davino
Sesquiterpene alkaloids from *Euonymus japonica*	2303	B. H. Han, M. K. Park, J. H. Ryu, J. H. Park and H. Naoki
A major piperidine alkaloid from *Microcos philippinensis*	2309	A. M. Aguinaldo and R. W. Read
Zanthoxylum coriaceum alkaloids related to bishordeninyl terpenes	2315	M. Marcos, M. C. Villaverde, R. Riguera, L. Castedo and F. R. Stermitz
Plumeran alkaloids from *Kopsia profunda*	2321	T.-S. Kam and P.-S. Tan
Short Reports		
A keto fatty acid from *Lagerstroemia speciosa* seed oil	2323	C. M. Jehan, D. Daulatabad and A. M. Mirajkar
Arachidonic acid and prostaglandins in buds of *Populus balsamifera*	2325	E. D. Levin, E. V. Isaeva and V. E. Cherepanova

10-*O*-Benzoyltheveside and 10-dehydrogeniposide from the leaves of *Cerbera manghas*	2327	T. Yamauchi, F. Abe and A. S. C. Wan
Sesquiterpenes from *Heritiera ornithocephala*	2329	R. C. Cambie, A. R. Lal and F. Ahmad
Shizukaol A, a sesquiterpene dimer from *Chloranthus japonicus*	2332	J. Kawabata, Y. Fukushi, S. Tahara and J. Mizutani
Homomono- and sesquiterpenoids from the liverwort *Lophocolea heterophylla*	2334	M. Toyota, Y. Asakawa and J.-P. Frahm
A sesquiterpene alcohol from the red alga *Laurencia nipponica*	2337	A. Fukuzawa, M. Aye, Y. Takaya, T. Masamune and A. Murai
Sesquiterpene lactones from *Tanacetum ferulaceum*	2339	A. G. Gonzalez, J. B. Barrera, J. T. Mendez, M. L. Sanchez and J. L. E. Martinez
Three oxygenated alantolides from *Inula racemosa*	2341	R. Goyal, B. R. Chhabra and P. S. Kalsi
Two diterpenes from *Euphorbia sieboldiana*	2343	Z.-J. Jia, Y.-L. Ding, Q.-G. Wang and Y.-T. Liu
Diterpenoids from *Salvia wiedemannii*	2346	G. Topcu and A. Ulubelen
2α-Hydroxymicromeric acid, a pentacyclic triterpene from *Terminalia chebula*	2348	C. Singh
Sterol glucosides from *Prunella vulgaris*	2351	H. Kojima, N. Sato, A. Hatano and H. Ogura
A naphthoquinone carboxylate from fungal infested *Diospyros montana*	2355	M. Pardhasaradhi and B. Nageswara Rao
An aryltetralin lignan from *Persea lingue*	2357	S. Sepulveda-Boza, S. Delhvi and B. K. Cassels
A flavanone glycoside from *Hamelia patens*	2358	R. Aquino, M. L. Ciavatta, F. De Simone and C. Pizza
The 7,7″-β-diglucoside of (2*S*,3*R*)-chamaejasmin from *Ormocarpum kirkii*	2361	E. Nyandat, A. Hassanali, Y. de Vicente, G. Multari and C. Galeffi
Flavonoids of *Brickellia longifolia*	2364	N. H. El-Sayed, J. A. Norris, A. A. Ahmed and T. J. Mabry
A hexa-substituted flavonol from *Distemonanthus benthamianus*	2366	E. Malan and S. Naidoo
A geranyl substituted flavonol from *Macaranga vedeliana*	2367	E. Hnawia, O. Thoison, F. Guéritte-Voegelein, D. Bourret and T. Sévenet
Kaempferol-3-(2,3-diacetoxy-4-*p*-coumaroyl)rhamnoside from leaves of *Myrica gale*	2369	R. R. Carlton, A. I. Gray, C. Lavaud, G. Massiot and P. G. Waterman
Coumestans from seeds of *Psoralea corylifolia*	2371	S. Gupta, B. N. Jha, G. K. Gupta, B. K. Gupta and K. L. Dhar
Alkaloids and diterpenoids from *Werneria decora*	2373	O. Lock De Ugaz, J. Franco, G. Seminario, F. Delle Monache, B. Millan, R. P. Ubillas Sanchez, E. O. Schlemper and M. S. Tempesta
An alkaloid from *Incarvillea sinensis*	2376	Y.-M. Chi, W.-M. Yan and J.-S. Li
C_{19}-Diterpenoid alkaloids of *Aconitum kongboense*	2379	J. Yue, Y. Chen and Y. Li

A norditerpenoid alkaloid from *Delphinium elatum* 2381 S. W. Pelletier, S. A. Ross and H. K. Desai

Alkaloids from *Strychnos pungens* 2384 P. Thépenier, M.-J. Jacquier, J. Hénin, G. Massiot, L. Le Men-Olivier and C. Delaude

Two phenanthrene alkaloids from *Fissistigma glaucescens* 2387 Y.-C. Wu, S.-C. Kao, J.-F. Huang, C.-Y. Duh and S.-T. Lu

Quaternary alkaloids in rhizomes of *Ranunculus serbicus* 2389 A. Bonora, B. Tosi, G. Dall'Olio and A. Bruni

Book Reviews

Studies in Natural Products Chemistry: Vol. 4: Stereoselective Synthesis, Part C: edited by Atta-ur-Rahman 2391 J. Mann

Plant Polyphenols: Vegetable Tannins Revisited: by E. Haslam 2391 L. G. Butler

Number 8

Review Article Number 55

Biotransformation of exogenous substrates by plant cell cultures 2393 T. Suga and T. Hirata

Growth and Metabolism

Changes in *m*RNA during low temperature storage and ripening of pears 2407 I. D. Wilson, G. A. Tucker, M. Knee and D. Grierson

Characterization of maize polyamine oxidase 2411 R. Federico, A. Cona, R. Angelini, M. E. Schininà and A. Giartosio

Purification and properties of emodin deoxygenase from *Pyrenochaeta terrestris* 2415 J. A. Anderson, B.-K. Lin and S. S. Wang

Multiple forms of endopeptidase activity from jojoba seeds 2419 M. J. Wolf and R. D. Storey

α- and β-Galactosidase activities in juice vesicles of stored Valencia oranges 2425 J. K. Burns

Glutathione *S*-transferase from oxadiazon treated chickpea 2431 A. A. Hunaiti and B. R. Ali

Pentose phosphate pathway enzymes in nitrogen-fixing leguminous root nodules 2437 Z. Q. Hong and L. Copeland

Fractionation and analysis of fucans from brown algae 2441 S. Mabeau, B. Kloareg and J.-P. Joseleau

Chemical bioregulation of carotenogenesis in *Phycomyces blakesleeanus* 2447 W.-J. Hsu, H. Yokoyama and C. DeBenedict

Evidence for conversion of arachidonic acid to hydroxyicosatetraenoic acids by a cell-free homogenate from maize seedlings 2453 B. Janistyn

12-Lipoxygenase activity in the red marine alga *Gracilariopsis lemaneiformis* 2457 M. F. Moghaddam and W. H. Gerwick

Analysis of major classes of plant lipids by high-performance liquid chromatography with flame ionization detection 2461 R. A. Moreau, P. T. Asmann and H. A. Norman

Ecological Biochemistry

Lipid changes in cold hardened leaves of *Nothofagus dombeyi* 2467 M. Alberdi, J. Fernandez, R. Cristi, M. Romero and D. Rios

Volatiles from flowers of *Nicotiana sylvestris*, *N. otophora* and *Malus* × *domestica*: headspace components and day/night changes in their relative concentrations 2473 J. H. Loughrin, T. R. Hamilton-Kemp R. A. Andersen and D. F. Hildebrand

Stimulation of witchweed germination by sesquiterpene lactones: a structure–activity study 2479 N. H. Fischer, J. D. Weidenhamer, J. L. Riopel, L. Quijano and M. A. Menelaou

Biological activities of furostanol saponins from *Nicotiana tabacum* 2485 S. Grünweller, E. Schröder and J. Kesselmeier

Some biologically active tannins of *Nuphar variegatum* 2491 K. Nishizawa, I. Nakata, A. Kishida, W. A. Ayer and L. M. Browne

5-(2-carboxyethyl)-6-Hydroxy-7-methoxybenzofuran, a fungal metabolite of xanthotoxin 2495 G. F. Spencer, A. E. Desjardins and R. D. Plattner

Chrysanthones B and C, secondary metabolites produced by the fungus *Ascochyta chrysanthemi* 2499 A. Arnone, G. Assante, G. Nasini and O. Vajna de Pava

Insect antifeeding agents: sesquiterpene alkaloids from *Celastrus angulatus* 2503 J.-K. Liu, Z.-J. Jia, D.-G. Wu, Jun-Zhou and Q.-G. Wang

Biosynthesis

Biosynthesis of β-(1,2,4-triazol-1-yl)alanine in higher plants 2507 F. Ikegami, Y. Komada, M. Kobori, D. R. Hawkins and I. Murakoshi

Biosynthesis of 2-hydroxy-3-butenylglucosinolate and 3-butenylglucosinolate in *Brassica napus* 2509 J. T. Rossiter, D. C. James and N. Atkins

Effect on ergosterol biosynthesis of a fungicide, SSF-109, in *Botrytis cinerea* 2513 N. Shirane, A. Murabayashi, M. Masuko, A. Uomori, Y. Yoshimura, S. Seo, K. Uchida and K. Takeda

The metabolism of tropinone in intact *Datura innoxia* plants 2521 M. E. Landgrebe and E. Leete

Cell Culture and Biotechnology

Trehalase activity in plant tissue cultures 2525 E. J. Kendall, R. P. Adams and K. K. Kartha

Senescence-related lipid changes in callus cultures of *Datura innoxia* 2529 K. Manoharan, R. Prasad and S. Guha-Mukherjee

Constituents of *Chrysanthemum cinerariaefolium* in leaves, regenerated plantlets and callus 2533 S. W. Zito and C. D. Tio

Lignins released from *Picea abies* suspension cultures—true native spruce lignins? 2535 G. Brunow, R. M. Ede, L. K. Simola and J. Lemmetyinen

Caffeine and theanine from cultured cells of *Camellia sinensis* 2539 T. Furuya, Y. Orihara and Y. Tsuda

Variation in tropane alkaloid accumulation within the Solanaceae and strategies for its exploitation 2545 A. J. Parr, J. Payne, J. Eagles, B. T. Chapman, R. J. Robins and M. J. C. Rhodes

Chemotaxonomy

Analysis of phenolics of bud exudate of *Populus angustifolia* by GC-MS 2551 W. Greenaway and F. R. Whatley

Malonylated flavone 5-*O*-glucosides in the barren sprouts of *Equisetum arvense* 2555 M. Veit, H. Geiger, F.-C. Czygan and K. R. Markham

Flavonoids from the leaves of *Boscia salicifolia* 2561 A. Walter and U. Séquin

Plant Chemistry

Sesquiterpenoids from the liverwort *Ricciocarpos natans* 2565 G. Wurzel and H. Becker

Sesquiterpene aryl esters from *Armillaria mellea* 2569 D. M. X. Donnelly, R. M. Hutchinson, D. Coveney and M. Yonemitsu

An immunostimulant sesquiterpene glycoside from *Sphaeranthus indicus*	2573	M. S. Shekhani, P. M. Shah, A. Yasmin, R. Siddiqui, S. Perveen, K. M. Khan, S. U. Kazmi and Atta-ur-Rahman
β-Agarofuran sesquiterpenes from *Maytenus canariensis*	2577	A. G. González, I. A. Jiménez, A. G. Ravelo and I. L. Bazzocchi
Sesquiterpene lactones and kaurane glycosides from *Francoeuria crispa*	2581	M. Abdel-Mogib, J. Jakupovic, A. M. Dawidar, M. A. Metwally and M. Abou-Elzahab
A diterpenoid from *Halimium viscosum*	2585	J. G. Urones, I. S. Marcos and N. M. Garrido
Diterpenoids from *Rabdosia setschwanensis*	2591	Huang Hao, Zhang Hongjie and Sun Handong
Fusicoccane-, dolabellane- and rearranged labdane-type diterpenoids from the liverwort *Pleurozia gigantea*	2597	Y. Asakawa, X. Lin, M. Tori and K. Kondo
Bicyclic diterpenes from two species of brown algae of the Dictyotaceae	2605	M. O. Ishitsuka, T. Kusumi, A. Ichikawa and H. Kakisawa
ent-Labdane glycosides from *Baccharis pingraea*	2611	C. Zdero, F. Bohlmann and H. M. Niemeyer
Quassinoids from *Picrasma javanica*	2617	K. Koike and T. Ohmoto
A B-ring contracted spirostane from *Tacca leontopetaloides*	2623	A. Abdel-Aziz, K. Brain, M. A. Shatalebi, G. Blunden, A. Patel, T. A. Crabb and A. K. Bashir
Saponins from *Crossopteryx febrifuga*	2629	P. Gariboldi, L. Verotta and B. Gabetta
Unusual anthraquinone lactones from *Araliorhamnus vaginata*	2637	W. Mammo, E. Dagne, I. Casser and W. Steglich
Hydroxy-(methylbutenynyl)-benzoic acid and derivatives from *Curvularia fallax*	2641	W.-R. Abraham and H.-A. Arfmann
Two caffeic acid tetramers having enantiomeric phenyldihydronaphthalene moieties from *Macrotomia euchroma*	2645	M. Nishizawa, M. Tsuda and K. Hayashi
Lignans and *nor*-neolignans from *Krameria interior*	2651	X. A. Dominguez, H. Sanchez V., G. C. Espinoza B., J. Verde S., H. Achenbach and W. Utz
Arylnaphthalene neolignans from *Virola calophylla*	2655	J. C. Martinez V., M. Yoshida and O. R. Gottlieb
Two arylnaphthalene lignans from *Haplophyllum buxbaumii*	2659	Y. Al-Abed, S. Sabri, M. A. Zarga, Z. Shah and Atta-ur-Rahman
Flavonoids in the roots of *Euchresta horsfieldii* in Thailand	2663	M. Mizuno, T. Tanaka, K. Tamura, N. Matsuura, M. Iinuma and C. Phengklai
Two flavanones in *Sophora leachiano* and some related structures	2667	M. Iinuma, T. Tanaka, M. Mizuno, Y. Shirataki, I. Yokoe, M. Komatsu and F. A. Lang
O-Geranylated and *O*-prenylated flavonoids from *Millettia ferruginea*	2671	E. Dagne, A. Bekele, H. Noguchi, M. Shibuya and U. Sankawa
Isoflavones from stems of *Euchresta horsfieldii*	2675	M. Mizuno, N. Matsuura, M. Iinuma, T. Tanaka and C. Phengklai

C-Prenylated isoflavones from *Millettia ferruginea* 2679 E. Dagne and A. Bekele

9-*O*-Demethyl-2α-hydroxyhomolycorine, an alkaloid from *Narcissus tortifolius* 2683 J. Bastida, C. Codina, F. Viladomat, M. Rubiralta, J.-C. Quirion and H.-P. Husson

A heterodimer alkaloid from *Narcissus pallidiflorus* 2685 C. Codina, F. Viladomat, J. Bastida, M. Rubiralta and J.-C. Quirion

Cytotoxic pyridone alkaloids from *Piper aborescens* 2689 C.-Y. Duh, Y.-C. Wu and S.-K. Wang

Alkaloids from the leaves and stem bark of *Ervatamia malaccensis* 2693 P. Clivio, B. Richard, M. Zeches, L. Le Men-Olivier, S. H. Goh, B. David and T. Sevenet

Short Reports

Alkaloids and lipid constituents of *Echinops niveus* 2697 R. S. Bhakuni, Y. N. Shukla and R. S. Thakur

Majoranolide: a δ-lactone from *Persea major* 2698 W. Ma, J. E. Anderson, C. Chang, D. L. Smith and J. L. McLaughlin

A sesquiterpene acid from *Eremophila interstans* 2700 E. L. Ghisalberti, P. R. Jefferies and H. T. N. Vu

Sesquiterpene ketones related to davanone from *Artemisia pallens* 2702 C. A. N. Catalán, M. del R. Cuenca, J. Verghese, M. T. Joy, A. B. Gutiérrez and W. Herz

seco-Germacranolides from *Anthemis pseudocotula* 2704 M. A. El-Ela, J. Jakupovic, F. Bohlmann, A. A. Ahmed, A. S. El-Din, S. Khafagi, N. Sabri and M. El-Ghazouly

Germacranolides from *Gutenbergia cordifolia* 2706 C. Zdero and F. Bohlmann

A resin acid from *Pinus sylvestris* needles 2708 L. Buratti, J.-P. Allais and M. Barbier

A rearranged abietane diterpenoid from the root of *Teucrium fruticans* 2710 M. Bruno, M. C. de la Torre, G. Savona, F. Piozzi and B. Rodríguez

Hydrolysis of the diterpenoid glycoside, stevioside 2712 A. G. Avent, J. R. Hanson and B. H. de Oliveira

Terpenoids from *Conyza stricta* 2715 M. Ahmed and A. A. Ahmed

A steroidal ester from *Coelogyne uniflora* 2717 P. L. Majumder and S. Pal

A quassinoid from *Brucea javanica* 2720 L.-Z. Lin, G. A. Cordell, C.-Z. Ni and J. Clardy

A triterpene saponin from *Cylicodiscus gabunensis* 2723 H. P. Tchivounda, B. Koudogbo, J. C. Tabet and E. Casadevall

Benzoylglucoses from two *Vaccinium* species 2726 B. Heimhuber, V. Wray, R. Galensa and K. Herrmann

p-Coumaric acid derivatives from *Artemisia monosperma* 2728 M. Abdel-Mogib, A. M. Dawidar, M. A. Metwally and M. Abou-Elzahab

Dibenzocyclooctadiene lignans possessing a spirobenzofuranoid skeleton from *Kadsura coccinea* 2730 L.-N. Li and H. Xue

A neolignan from *Piper sumatranum* 2733 S. Malhotra, S. K. Koul, S. C. Taneja, P. Pushpangadan and K. L. Dhar

Dihydrochalcones from *Iryanthera sagotiana* 2735 K. Kawanishi, T. Takagaki and Y. Hashimoto

A retrochalcone from *Anredera scandens* 2737 F. Calzada, R. Mata, R. Bye and E. Linares

Two flavanones from *Euchresta horsfieldii* 2738 M. Mizuno, T. Tanaka, N. Matsuura, M. Iinuma and C. Cheih

5,5′-Dihydroxy-3,7,2′,4′-tetramethoxyflavone from *Chlorophora excelsa* 2741 E. Malan, E. Swinny, D. Ferreira and A. J. Hall

Kaempferol 3-rhamnoside-7-[6-feruloylglucosyl(1 → 3)rhamnoside] from *Asplenium prolongatum* 2742 M. Mizuno, Y. Kyotani, M. Iinuma, T. Tanaka and K. Iwatsuki

19-*O*-Methylangustoline from *Camptotheca acuminata* 2744 L.-Z. Lin and G. A. Cordell

An indolinic cryptoalkaloid from *Strychnos mattogrossensis* 2746 L. Angenot, M. L. Belem-Pinheiro, A. F. Imbiriba da Rocha, P. Poukens-Renwart, J. Quetin-Leclercq and R. Warin

NMR spectroscopic analysis of ancistrocladidine 2750 D. Meksuriyen, N. Ruangrungsi, P. Tantivatana and G. A. Cordell

Number 9

Announcements vii

Review Article Number 56
Acetylenes and related compounds in Cynareae 2753 L. P. Christensen and J. Lam

Growth and Metabolism
Anti-auxin effects of 3-oxo-1,2-benzisothiazolin-2-ylalkanoic acids 2787 D. Ricci, C. A. Maggiali, G. Morini and F. Ronchini

Ring-methyl hydroxylation of chlortoluron by an inducible cytochrome P450-dependent enzyme from maize 2793 R. Fonné-Pfister and K. Kreuz

Modification of pea root meristem nuclei proteins by poly(ADP-ribose) 2797 W. A. Tramontano and D. C. DeCostanzo

Cereal dietary proteins with sites for cross-linking by transglutaminase 2801 R. Porta, V. Gentile, C. Esposito, L. Mariniello and S. Auricchio

Low molecular weight albumins from sunflower seed: identification of a methionine-rich albumin 2805 A. A. Kortt and J. B. Caldwell

Soluble and bound hydroxyproline-rich glycoproteins in control and wounded oat and barley primary leaves 2811 Z.-C. Li and J. W. McClure

The 3′,5′-cyclic nucleotide phosphodiesterases of meristematic and differentiated tissues of pea roots 2815 D. Chiatante, R. P. Newton, S. Crignola, M. Levi and E. G. Brown

Pectin methyl esterase from *Actinidia chinensis* fruits 2821 A. Giovane, L. Quagliuolo, D. Castaldo, L. Servillo and C. Balestrieri

Multiple forms of acid phosphatase from seedling axes of *Vigna radiata*	2825	P. De-Kundu and A. C. Banerjee
Asparaginase, allantoinase and glutamine synthetase activities in soybean cotyledons grown *in vitro*	2829	G. S. Tonin and L. Sodek
Permeability characteristics and membrane lipid composition of potato tuber cultivars in relation to Ca^{2+} deficiency	2833	H. V. Davies and L. S. Monk-Talbot
Effects of osmotic stress on the essential oil content and composition of peppermint	2837	D. J. Charles, R. J. Joly and J. E. Simon
Ecological Biochemistry		
Induction and purification of kievitone hydratase from *Fusarium solani* f. sp. *phaseoli*	2841	C. S. Turbek, D. Li, G. H. Choi, C. L. Schardl and D. A. Smith
Identification of some volatile compounds from strawberry flowers	2847	T. R. Hamilton-Kemp, J. H. Loughrin and R. A. Andersen
A molluscicidal and antifungal triterpenoid saponin from the roots of *Clerodendrum wildii*	2849	M. Toyota, J. D. Msonthi and K. Hostettmann
Ergostanoids from *Petunia parodii*	2853	C. A. Elliger, A. C. Waiss, Jr, M. Benson and R. Y. Wong
Dihydroflavonol sweeteners and other constituents from *Hymenoxys turneri*	2865	F. Gao, H. Wang, T. J. Mabry and A. D. Kinghorn
Pyrrolizidine alkaloids from *Cynoglossum germanicum*	2871	A. R. Mattocks and C. D. Pigott
Biosynthesis		
Genetic control of perillene accumulation in *Perilla frutescens*	2873	A. Nishizawa, G. Honda and M. Tabata
Biosynthesis of the terpenoidic polyketide fusalanipyrone	2877	W.-R. Abraham, I. Knoch and L. Witte
Purification and characterization of pterocarpan synthase from elicitor-challenged soybean cell cultures	2879	D. Fischer, C. Ebenau-Jehle and H. Grisebach
Cell Culture and Biotechnology		
Purification and properties of native cell wall acid phosphatase from cultured tobacco cells	2883	T. S. Kaneko, R. Kikuti and K. Kubota
Sesquiterpene lactone production in callus culture of *Ambrosia tenuifolia*	2889	M. E. Goleniowski, G. L. Silva and V. S. Trippi
Chemotaxonomy		
Tricoumaroylspermidine in flowers of Rosaceae	2893	D. Strack, U. Eilert, V. Wray, J. Wolff and H. Jaggy
A carene-free chemotype of *Pinus sylvestris*	2897	G. Weissmann and W. Lange
Malonylated chalcone glycosides in *Dahlia*	2899	J. B. Harborne, J. Greenham and J. Eagles
Plant Chemistry		
Dithiacyclohexadiene chlorohydrins and related sulphur containing polyynes from *Ambrosia chamissonis*	2901	F. Balza and G. H. N. Towers
Secoiridoid glycosides from *Jasminum multiflorum*	2905	Y.-C. Shen, C.-Y. Lin and C.-H. Chen
Sesquiterpene lactones from *Artemisia caerulescens* subsp. *gargantae*	2913	J. F. Sanz and J. A. Marco
A melampolide from *Artemisia oliveriana*	2919	J. F. Sanz, A. Rustaiyan and J. A. Marco

Sesquiterpene polyol esters from *Celastrus gemmatus*	2923	Tu Yongqiang, Wu Dagang, Zhou Jun and Chen Yaozu
Diterpenoids of *Halimium viscosum*	2927	J. G. Urones, I. S. Marcos, N. M. Garrido and P. B. Barcala
neo-Clerodane diterpenoids from *Ajuga chamaepitys*	2931	I. M. Boneva, B. P. Mikhova, P. Y. Malakov, G. Y. Papanov, H. Duddeck and S. L. Spassov
Three diterpenes with a secolabdane skeleton from *Clutia abyssinica*	2935	R. D. Waigh, B. Zerihun and M. R. Euerby
Clerodane diterpenes from *Zuelania guidonia* stem bark	2939	M. R. Khan, A. I. Gray and P. G. Waterman
Diterpenes from *Calceolaria lepida*	2943	M. C. Chamy, M. Piovano, J. A. Garbarino, C. Miranda and V. Gambaro
Terpenoid glycosides from *Picris hieracioides*	2947	T. Uchiyama, K. Nishimura, T. Miyase and A. Ueno
Limonoids from *Trichilia havanensis*	2953	C. Arenas and L. Rodríguez-Hahn
Steroid glycosides from *Asparagus adscendens*	2957	M. Tandon, Y. N. Shukla and R. S. Thakur
A pregnane ester tetraglycoside from *Dregea lanceolata*	2961	G. Krishna, G. V. Shinde, M. S. Shingare, A. Khare and M. P. Khare
Carolinoside: a phytosteroidal glycoside from *Solanum carolinense*	2965	J. D. Thacker, J. Bordner and C. Bumgardner
Structure and stereochemistry of four α-pyrones from *Hyptis oblongifolia*	2971	R. Pereda-Miranda, M. García and G. Delgado
A galloylated monoterpene glucoside and a dimeric hydrolysable tannin from *Cornus officinalis*	2975	T. Hatano, T. Yasuhara, R. Abe and T. Okuda
Structure and synthesis of phlobatannins related to (−)-fisetinidol-(−)-epicatechin profisetinidins	2979	J. P. Steynberg, J. F. W. Burger, A. Cronjé, S. L. Bonnet, J. C. S. Malan, D. A. Young and D. Ferreira
Lignans from *Justicia hyssopifolia*	2991	J. M. Trujillo, E. Jorge R., E. Navarro and J. Boada
A flavan-3-ol glycoside from bark of *Plumeria rubra*	2995	L. B. S. Kardono, S. Tsauri, K. Padmawinata and A. D. Kinghorn
Two acylated anthocyanins from *Dioscorea alata*	2999	Y. Shoyama, I. Nishioka, W. Herath, S. Uemoto, K. Fujieda and H. Okubo
Xanthones from *Hypericum reflexum*	3003	M. L. Cardona, I. Fernández, J. R. Pedro and A. Serrano
Alkaloids from leaves and stem bark of *Ervatamia polyneura*	3007	P. Clivio, B. Richard, H. A. Hadi, B. David, T. Sevenet, M. Zeches and L. Le Men-Olivier
Two oxindole alkaloids from *Gelsemium elegans*	3013	L.-Z. Lin, G. A. Cordell, C.-Z. Ni and J. Clardy
Short Reports		
Immunologically active polysaccharide from *Phragmites communis*	3019	J.-N. Fang, Y.-A. Wei, B.-N. Liu and Z.-H. Zhang

Germacranolides from *Tanacetum polycephalum*	3022	A. Rustaiyan, K. Zare, Z. Habibi and M. Hashemi
Caudatol, a guaianolide from *Pericome caudata*	3024	S. D. Jolad, J. J. Hoffmann, R. B. Bates, S. Calders and S. P. McLaughlin
Guaianolides and other constituents from *Artemisia douglasiana*	3028	G. Rodriguez, L. J. Pestchanker, M. J. Pestchanker and O. S. Giordano
Glaucolides from *Spiracantha cornifolia*	3030	N. M. Hashemi-Nejad, J. Jakupovic and V. Castro
Glaucolide-like sesquiterpene lactones from *Tanacetum albi-pannosum*	3031	N. Gören and J. Jakupovic
Diterpenoids from *Rabdosia parvifolia*	3033	Y. Li and Y. Chen
Diterpenoids from *Scoparia dulcis*	3035	M. Ahmed and J. Jakupovic
Diterpenes from *Calceolaria latifolia*	3037	J. A. Garbarino and A. Molinari
A stemarane diterpene from *Calceolaria kingii*	3040	J. A. Garbarino and A. Molinari
Fregenedadiol: a rearranged labdane from *Halimium viscosum*	3042	J. G. Urones, I. S. Marcos, N. M. Garrido and R. F. Moro
A friedelane triol from the roots of *Pristimera grahamii*	3044	E. Sukumar, R. Bhima Rao and A. B. Kundu
Cymbinodin-A, a phenanthraquinone from *Cymbidium aloifolium*	3046	A. K. Barua, B. B. Ghosh, S. Ray and A. Patra
Lignans from wood of *Calocedrus formosana*	3048	J.-M. Fang, M.-Y. Liu and Y.-S. Cheng
trans-Coniferyl alcohol 4-*O*-sulphate and flavonoid sulphates from some *Tamarix* species	3050	F. A. Tomás-Barberán, E. Iniesta-Sanmartín, F. Ferreres, F. Tomás-Lorente, W. Trowitzsch-Kienast and V. Wray
Two stilbenoids from the orchid *Eria flava*	3052	P. L. Majumder and S. Banerjee
Revision of the stereochemistry of (+)-tuberine, an alkaloid from *Haplophyllum tuberculatum*	3055	A. T. McPhail, D. R. McPhail, M. S. Al-Said, M. M. El-Domiaty and F. S. El-Feraly
Alkaloids and phenolics of *Colchicum turcicum*	3058	A. Husek, N. Sütlüpinar, P. Sedmera, F. Voegelein, I. Válka and V. Šimánek
β-Carboline alkaloids from *Picrasma quassioides*	3060	K. Koike, T. Ohmoto and K. Ikeda
Book Reviews		
Photosynthetic Pigments of Algae: by K. S. Rowan	3063	L. Rogers
Studies in Natural Products Chemistry, Volume VB, Structure Elucidation: edited by Atta-ur-Rahman	3063	J. B. Harborne
The Pesticide Conspiracy: by R. van den Bosch	3064	J. B. Harborne
Mycotoxins and Phycotoxins 1988: edited by S. Natori, K. Hashimoto and Y. Ueno	3064	J. B. Harborne

Number 10

The Pergamon Phytochemistry Medal and Prize 3065

Growth and Metabolism

Effect of increased light intensity on photosynthetic rate and ribulose 1,5-bisphosphate carboxylase in bean leaves — 3067 A. Suzuki, M. Lelandais and J.-F. Morot-Gaudry

Higher plant heat-shock protein 70: purification and immunochemical analysis — 3073 M. C. Wilkinson, P. A. Wheatley, C. J. Smith and D. L. Laidman

Membrane-bound malate dehydrogenase in mitochondria from the alga *Cyanidium caldarium* — 3081 W. Gross

Lipid changes in barley seedlings subjected to water and cold stress — 3087 G. E. Zúñiga, J. Fernandez, R. Cristi, M. Alberdi and L. J. Corcuera

A reticuloendothelial system-activating glycan from the barks of *Eucommia ulmoides* — 3091 M. Tomoda, R. Gonda, N. Shimizu and M. Kanari

Seasonal variations in the content of sennosides in leaves and pods of two *Cassia fistula* populations — 3095 L. M. Cano Asseleih, O. Hernandez Hernandez and J. Rangel Sanchez

Ecological Biochemistry

Polyacetylenes from *Artemisia borealis* and their biological activities — 3101 Y. Wang, M. Toyota, F. Krause, M. Hamburger and K. Hostettmann

Accumulation of antibacterial sesquiterpenoids in bacterially inoculated *Gossypium* leaves and cotyledons — 3107 M. Essenberg, P. B. Grover, Jr and E. C. Cover

Dimethyl terephthalate pollution in red algae — 3115 K. C. Güven, J. Reisch, Z. Kizil, B. Güvener and E. Cevher

Biosynthesis

Biosynthesis of lathyrine; a novel synthase activity — 3117 E. G. Brown and J. Mohamad

Cell Culture and Biotechnology

Biotransformation of 18β-glycyrrhetinic acid by cultured cells of *Eucalyptus perriniana* and *Coffea arabica* — 3123 Y. Orihara and T. Furuya

Formation of soyasaponins in licorice cell suspension cultures — 3127 H. Hayashi, T. Sakai, H. Fukui and M. Tabata

Mikimopine, an opine in hairy roots of tobacco induced by *Agrobacterium rhizogenes* — 3131 A. Isogai, N. Fukuchi, M. Hayashi, H. Kamada, H. Harada and A. Suzuki

Two-phase culture for the enhanced production of benzophenanthridine alkaloids in cell suspensions of *Eschscholtzia californica* — 3135 S. Y. Byun, H. Pedersen and C.-K. Chin

Chemotaxonomy

Distribution of dipeptides containing D-alanine in crop seedlings of some Gramineae — 3141 H. Manabe

Distribution of dipeptides containing D-alanine in *Oryza* species — 3143 H. Manabe

Phospholipid composition of some marine red algae — 3149 V. M. Dembitsky and O. A. Rozentsvet

Thiophene derivatives and polyacetylenes from *Dahlia tubulata* — 3153 L. P. Christensen, J. Lam and T. Thomasen

A chalcone and other constituents of *Bidens tripartitus* — 3155 L. P. Christensen, J. Lam and T. Thomasen

Terpenes of foliage oils from *Halocarpus bidwillii* — 3157 A. R. Hayman and R. T. Weavers

Cacalol derivatives from Dominican *Senecio* species — 3163 F. Bohlmann, S. Dupré and B. Nordenstam

Diterpenes and sesquiterpene xylosides from East African *Conyza* species	3167	C. Zdero, A. A. Ahmed, F. Bohlmann and G. M. Mungai
Diterpenes and other constituents from *Relhania* species	3173	F. Tsichritzis and J. Jakupovic
Quinone-methide, phenolic and related triterpenoids of plants of Celastraceae: further evidence for the structure of celastranhydride	3189	C. B. Gamlath, A. A. L. Gunatilaka, Y. Tezuka, T. Kikuchi and S. Balasubramaniam
Plant Chemistry		
Three halogenated metabolites from *Laurencia obtusa*	3193	S.-E. N. Ayyad, A.-A. M. Dawidar, H. W. Dias, R. A. Howie, J. Jakupovic and R. H. Thomson
Iridolactones from *Alyxia reinwardti*	3197	G. Topcu, C.-T. Che, G. A. Cordell and N. Ruangrungsi
Eudesmane derivatives and other constituents from *Apalochlamys spectabilis* and *Cassinia* species	3201	C. Zdero, F. Bohlmann and R. M. King
Eudesmane glycosides from *Carthamus lanatus*	3207	A. San Feliciano, M. Medarde, B. Del Rey, J. M. Miguel Del Corral and A. F. Barrero
Bisabolene derivatives and other constituents from *Achillea odorata*	3213	A. F. Barrero, E. J. Alvarez-Manzaneda R. and R. Alvarez-Manzaneda R.
Sesquiterpene glycosides from *Ixeris debilis* and *Ixeris repens*	3217	T. Warashina, M. Ishino, T. Miyase and A. Ueno
Sesquiterpene esters from *Maytenus disticha*	3225	O. M. Muñoz, A. G. Gonzalez, A. G. Ravelo, J. G. Luis, J. T. Vazquez, M. P. Nuñez and I. A. Jimenez
Rearranged cuparane-type sesqui- and clerodane-type diterpenoids from the liverwort *Demotarisia linguifolia*	3229	F. Nagashima and Y. Asakawa
Rearranged clerodanes and other diterpenes from *Microglossa pyrrhopappa*	3233	C. Zdero, F. Bohlmann and G. M. Mungai
Tormesane derivatives of *Halimium viscosum*	3243	J. G. Urones, I. S. Marcos and N. M. Garrido
seco-Labdanes and other constituents from *Ophryosporus floribundus*	3247	C. Zdero, F. Bohlmann and H. M. Niemeyer
Cylicodiscic acid, a dihydroxy pentacyclic triterpene carboxylic acid from *Cylicodiscus gabunensis*	3255	H. P. Tchivounda, B. Koudogbo, Y. Besace and E. Casadevall
Friedelane and oleanane triterpenoids from bark wood of *Austroplenckia populnea*	3259	J. R. De Sousa, G. D. F. Silva, J. L. Pedersoli and R. J. Alves
A tetracyclic triterpene lactone and other constituents from the bark of *Abies firma*	3263	R. Tanaka, A. Inosiri, M. Yoneda, T. Ishida, A. Numada and S. Matsunaga
Veitchiolide, a tetracyclic triterpene lactone from *Abies veitchii*	3267	R. Tanaka and S. Matsunaga
Cycloartane triterpene glycosides from Egyptian *Astragalus* species	3271	N. A. El-Sebakhy, F. M. Harraz, R. M. Abdallah, A. M. Asaad, F. Orsini, F. Pelizzoni, G. Sello and L. Verotta
A dimeric triterpene-glycoside from *Rubus coreanus*	3275	K. Ohtani, C. Miyajima, T. Takahasi, R. Kasai, O. Tanaka, D.-R. Hahn and N. Naruhashi
Triterpenoid saponins from fruit of *Lagenaria breviflora*	3281	A. A. Elujoba, A. F. Fell, P. A. Linley and D. J. Maitland

Saponins from the leaves of *Guaiacum officinale* 3287 V. U. Ahmad, S. Perveen and S. Bano

Saponins from *Tridesmostemon claessenssi* 3291 G. Massiot, C. Lavaud, C. Delaude, G. Van Binst, S. P. F. Miller and H. M. Fales

Caffeoylmalic and two pyrrole acids from *Parietaria officinalis* 3299 J. Budzianowski

Six glycosides from *Rehmannia glutinosa* var. *purpurea* 3303 H. Nishimura, H. Sasaki, T. Morota, M. Chin and H. Mitsuhashi

Flavonoids and isoflavonoids from the heartwood of *Virgilia oroboides* 3307 E. Malan and E. Swinny

Flavonol glycosides from *Epimedium wushanense* 3311 Y.-S. Li and Y.-L. Liu

Cyclic peptide and peptide alkaloids from seeds of *Zizyphus vulgaris* 3315 B. H. Han, M. H. Park and Y. N. Han

Alkaloids from leaves and bark of *Alstonia scholaris* in the Philippines 3321 T. Yamauchi, F. Abe, W. G. Padolina and F. M. Dayrit

An antimicrobial alkaloid from *Ficus septica* 3327 B. Baumgartner, C. A. J. Erdelmeier, A. D. Wright, T. Rali and O. Sticher

Assignments of ^{1}H and ^{13}C NMR resonances of some isoquinoline alkaloids 3331 R. H. A. M. Janssen, P. Wijkens, C. Kruk, H. W. A. Biessels, F. Menichini and H. G. Theuns

Alkaloids from *Alstonia undulata* 3341 T.-M. Pinchon, J.-M. Nuzillard, B. Richard, G. Massiot, L. Le Men-Olivier and T. Sevenet

Alkaloids from stem-bark of *Tonduzia pittieri* 3345 A.-M. Morfaux, P. Mouton, G. Massiot and L. Le Men-Olivier

Short Reports

Sulphur constituents of neem seed volatiles: a revision 3351 A. M. Mubarak and C. P. Kulatilleke

Kingiside and derivative from *Gentiana pyrenaica* 3353 J. Garcia, E. Mpondo Mpondo and M. Kaouadji

Dihydroxypallenone, a sesquiterpene with a new carbon skeleton from *Pallenis spinosa* 3355 A. A. Ahmed, J. Jakupovic and F. Bohlmann

A triterpenoid from *Katsura heteroclita* 3358 Chen Yiping, Lin Zhongwen, Zhang Hongjie and Sun Handong

3β,24-Dihydroxyolean-12-en-28-oic acid, a pentacyclic triterpene acid from *Lantana indica* 3360 S. K. Singh, V. J. Tripathi and R. H. Singh

Quinonoid and other constituents of *Vismia martiana* 3362 T. J. Nagem and T. De Jesus Faria

6-*O*-Demethyl-5-deoxybostrycoidin, a 2-aza-anthraquinone produced by the fungus *Nectria haematococca* 3364 D. Parisot, M. Devys and M. Barbier

Two diarylheptanoids and a lignan from *Casuarina junghuhniana* 3366 N. Kaneda, A. D. Kinghorn, N. R. Farnsworth, P. Tuchinda, J. Udchachon, T. Santisuk and V. Reutrakul

Palustroside, a coumarin glucoside ester from *Ledum palustre* 3369 M.-A. Dubois, M. Wierer and H. Wagner

Two flavones from *Psiadia arabica* 3372 F. S. El-Feraly, J. S. Mossa, M. A. Al-Yahya, M. S. Hifnawy, M. M. Hafez and C. D. Hufford

Kaempferol 3-sophoroside-4′-glucoside from *Asplenium septentrionale* 3374 F. Imperato

25-Isoetioline from two *Solanum* species 3375 H. Ripperger

17α-*O*-Methylyohimbine and vallesiachotamine from roots of *Amsonia elliptica* 3377 M. Sauerwein and K. Shimomura

Book Reviews

Plant Phenolics: edited by J. B. Harborne 3381 O. R. Gottlieb

Signals in Plant Development: edited by J. Krekule and F. Seidlova 3381 A. M. Boudet

Plants for Medicines: by D. J. Collins, C. C. J. Culvenor, J. A. Lamberton, J. W. Loder and J. R. Price 3382 J. B. Harborne

Carbon-13 NMR of Flavonoids: edited by P. K. Agrawal 3382 J. B. Harborne

Number 11

Obituary

Hans Grisebach 1926–1990 3383 J. B. Harborne

Growth and Metabolism

Does plant growth temperature modulate the membrane composition and ATPase activities of tonoplast and plasma-membrane fractions from rye roots? 3385 P. J. White, D. T. Cooke, M. J. Earnshaw, D. T. Clarkson and R. S. Burden

Characterization of pearl millet protein fractions 3395 M. Chandna and N. K. Matta

Biochemical evidence for the site of formation of gum arabic in *Acacia senegal* 3401 J.-P. Joseleau and G. Ullmann

Methylation analysis of carrageenans from tetrasporic and cystocarpic stages of *Gigartina skottsbergii* 3407 M. C. Matulewicz, M. Ciancia, M. D. Noseda and A. S. Cerezo

Comparison of pyrophosphate turnover and the maximum catalytic activity of pyrophosphate:fructose-6-phosphate phosphotransferase in leaves 3411 H. E. Neuhaus, K.-P. Krause and M. Stitt

Glycolipids, phospholipids and fatty acids of brown algae species 3417 V. M. Dembitsky, O. A. Rozentsvet and E. E. Pechenkina

Sterols of the plant pathogenic fungi *Botrytis cinerea* and *Pyrenophora teres* 3423 R. S. T. Loeffler and A. L. Hayes

Stereochemical differences in the anatomical distribution of C-24 alkylated sterols in *Kalanchoe daigremontiana* 3427 M. Kalinowska, W. R. Nes, F. G. Crumley and W. D. Nes

Ecological Biochemistry

Inhibitors of platelet aggregation from onion 3435 Y. Morimitsu and S. Kawakishi

Phomozin, a phytotoxin from *Phomopsis helianthi*, the causal agent of stem canker of sunflower 3441 C. Mazars, M. Rossignol, P. Auriol and A. Klaebe

Toxicity and antifeedant activity of a sesquiterpene lactone from *Encelia* against *Spodoptera littoralis* 3445 R. P. Srivastava, P. Proksch and V. Wray

A guaianolide phytoalexin, cichoralexin, from *Cichorium intybus* 3449 K. Monde, T. Oya, A. Shirata and M. Takasugi

Feeding-deterrent diterpenes from the brown alga *Dilophus okamurai* 3453 K. Kurata, K. Taniguchi, K. Shiraishi and M. Suzuki

Loss of colour, a prerequisite to plant pigmentation by flavonoids 3457 R. Brouillard, M.-C. Wigand and A. Cheminat

Biosynthesis

Enzymatic synthesis of the thyrotoxic amino acid mimosine by cysteine synthase 3461 F. Ikegami, M. Mizuno, M. Kihara and I. Murakoshi

An anomaly in the biosynthesis of (*E,E*)-farnesol by the crude enzyme system of *Pisum sativum* 3467 T. Yoshioka, R. Zheng, S. Ohta and T. Suga

Intermediate steps in the biosynthesis of abscisic acid from farnesyl pyrophosphate in *Cercospora rosicola* 3473 R. D. Bennett, S. M. Norman and V. P. Maier

Cardenolide biosynthesis from malonate in *Asclepias curassavica* 3479 H. W. Groeneveld, B. van den Berg, J. C. Elings and D. Seykens

Synthesis of 2-*O*-(4-coumaroyl)-*myo*-inositol by a protein preparation from needles of *Taxus baccata* 3487 J. Heilemann, V. Wray and D. Strack

Purification and characterization of three isoforms of *S*-adenosyl-L-methionine: (*R,S*)-tetrahydrobenzylisoquinoline-*N*-methyltransferase from *Berberis koetineana* cell cultures 3491 T. Frenzel and M. H. Zenk

The hydroxylation step in the biosynthetic pathway leading from norcoclaurine to reticuline 3499 S. Loeffler and M. H. Zenk

S-Adenosyl-L-methionine: 3′-hydroxy-*N*-methyl-(*S*)-coclaurine-4′-*O*-methyl transferase, a regio- and stereoselective enzyme of the (*S*)-reticuline pathway 3505 T. Frenzel and M. H. Zenk

Adenine metabolism and the synthesis of purine alkaloids in flowers of *Camellia* 3513 N. Fujimori and H. Ashihara

Feeding experiments using suspension cultures of *Atropa belladonna*; limiting steps in the biosynthesis of tropane alkaloids 3517 L. K. Simola, R. Parviainen, A. Martinsen, A. Huhtikangas, R. Jokela and M. Lounasmaa

Cell Culture and Biotechnology

IAA derivative induced tropane alkaloid production in root cultures of a *Duboisia* hybrid 3525 K. Yoshimatsu, T. Hatano, M. Katayama, S. Marumo, H. Kamada and K. Shimomura

Chemotaxonomy

Differentiation between *Melaleuca alternifolia* and *M. linariifolia* by monoterpenoid comparison 3529 I. A. Southwell and I. A. Stiff

A comparative study of the stem-bark drimane sesquiterpenes and leaf volatile oils of *Warburgia ugandensis* and *W. stuhlmannii* 3535 D. Kioy, A. I. Gray and P. G. Waterman

Sterol composition in five families of the order Caryophyllales 3539 G. W. Patterson and S. Xu

Flavone glycosides from *Asplenium normale* 3543 T. Iwashina, S. Matsumoto, K. Ozawa and K. Akuzawa

Alkaloids from the leaves of *Alstonia scholaris* in Taiwan, Thailand, Indonesia and the Philippines 3547 T. Yamauchi, F. Abe, R.-F. Chen, G. Nonaka, T. Santisuk and W. G. Padolina

Cytisine-12-carboxy-ethylester, a quinolizidine alkaloid from *Laburnum watereri* and its occurrence in the Leguminosae 3553 R. Greinwald, P. Bachmann, L. Witte and F.-C. Czygan

Plant Chemistry

Carbohydrate polymers from *Aloe ferox* leaves 3555 W. T. Mabusela, A. M. Stephen and M. C. Botha

Lilioside A from *Lilium longiflorum*: synthesis and absolute configuration 3559 M. Kaneda

Scammonins I and II, the resin glycosides of Radix scammoniae from *Convolvulus scammonia*	3565	N. Noda, H. Kogetsu, T. Kawasaki and K. Miyahara
Monoterpenes from asiasari Radix from *Asiasarum* sp.	3571	K. Hashimoto, T. Katsuhara, H. Itoh, Y. Ikeya, M. Okada and H. Mitsuhashi
Guaianolides from *Tanacetum annuum*	3575	A. F. Barrero, J. F. Sánchez, J. Molina, A. Barrón and Mª del Mar Salas
Sesquiterpene lactones from *Salvia palaefolia*	3581	A. G. González, T. A. Grillo, J. G. Luis, J. T. Vázquez, M. L. Rodríguez, J. L. Ravelo J. Calle and A. Rivera
Diterpenes from *Hoffmannia strigillosa*	3587	M. Jaensch, J. Jakupovic, H. Sanchez and X. A. Dominguez
Clerodane diterpenes from *Casearia corymbosa* stem bark	3591	M. R. Khan, A. I. Gray, I. H. Sadler and P. G. Waterman
nor-ent-Halimanes from *Halimium viscosum*	3597	J. G. Urones, I. S. Marcos, Mª J. Sexmero Cuadrado, P. Basabe and A. M. Lithgow
Triterpenoids from *Symplocos racemosa* bark	3601	M. Ali, K. K. Bhutani and T. N. Srivastava
Two triterpenoids from roots of *Glycyrrhiza yunnanensis*	3605	L. Zeng, R.-Y. Zhang, D. Wang and Z.-C. Lou
Triterpenoids, diarylheptanoids and their glycosides in the flowers of *Alnus* species	3611	T. Aoki, S. Ohta and T. Suga
Pentacyclic triterpenoids from *Plumeria obtusa*	3615	S. Siddiqui, B. S. Siddiqui, S. Begum and A. Naeed
Hydrolysable tannins from *Euphorbia thymifolia*	3621	S.-H. Lee, T. Tanaka, G. Nonaka and I. Nishioka
Phenolic compounds from *Plantago asiatica*	3627	H. Ravn, S. Nishibe, M. Sasahara and L. Xuebo
Triumbellin, a tricoumarin rhamnopyranoside from *Daphne mezereum*	3633	B. Kreher, A. Neszmélyi and H. Wagner
Three flavonol allosides from *Glaucidium palmatum*	3639	T. Iwashina and S. Ootani
Kaempferol glycosides from *Hosta ventricosa*	3643	J. Budzianowski
An unusual epimerization of the α-OH-1 group of the norditerpenoid alkaloid delphisine	3649	S. W. Pelletier, H. K. Desai, Q. Jiang and S. A. Ross
Short Reports		
Dibenzyl trisulphide and *trans-N*-methyl-4-methoxyproline from *Petiveria alliacea*	3653	J. R. de Sousa, A. J. Demuner, J. A. Pinheiro, E. Breitmaier and B. K. Cassels
A monoterpene glucoside from *Eupatorium tinifolium*	3656	M. D'Agostino, F. De Simone, F. Zollo and C. Pizza
Sesqui- and monoterpenes from *Jasonia montana*	3658	A. A. Ahmed and J. Jakupovic
Eudesmanolides and other constituents from *Artemisia herba-alba*	3661	A. A. Ahmed, M. Abou-El-Ela, J. Jakupovic, A. A. Seif El-Din and N. Sabri
An eudesmane-type sesquiterpene alcohol from the liverwort *Frullania tamarisci*	3664	M. Toyota and Y. Asakawa

Guaianolides from *Inula anatolica*	3666	G. Topcu and S. Öksüz
A glaucolide-type sesquiterpene lactone from *Vernonia galamensis* ssp. *nairobensis*	3668	C. Zdero, F. Bohlmann and G. M. Mungai
Sesquiterpene lactones and flavonoids from *Helenium radiatum*	3669	E. Petenatti, M. J. Pestchanker, M. Guo and E. Guerreiro
A clerodane diterpene and other constituents of *Clerodendron inerme*	3671	B. Achari, C. Chaudhuri, C. R. Saha, P. K. Dutta and S. C. Pakrashi
Taxanes from *Taxus yunnanensis*	3673	Z. Zhang and Z. Jia
Clematoside-S, a triterpenoid saponin from the roots of *Clematis grata*	3676	O. P. Sati, S. K. Uniyal, S. Bahuguna and T. Kikuchi
A C_{26} sterol from the brown alga *Eisenia bicyclis*	3678	K. Kurata, K. Taniguchi, K. Shiraishi and M. Suzuki
Xyloglucosides of benzyl and phenethyl alcohols and *Z*-hex-3-en-1-ol from leaves of *Alangium platanifolium* var. *trilobum*	3681	H. Otsuka, Y. Takeda and K. Yamasaki
Prenylated coumarates from *Artemisia xanthochroa*	3683	J. Jakupovic, R. X. Tan, F. Bohlmann, Z. J. Jia and S. Huneck
Further structural elucidation of the anthocyanin, deacylternatin, from *Clitoria ternatea*	3686	N. Terahara, N. Saito, T. Honda, K. Toki and Y. Osajima
Flavonoids from *Polygonum minus*	3687	J. G. Urones, I. S. Marcos, B. G. Pérez and P. B. Barcala
Two flavonol glycosides from *Chenopodium quinoa*	3690	F. De Simone, A. Dini, C. Pizza, P. Saturnino and O. Schettino
N'-Ethylnornicotine from Burley tobacco	3693	T. Braumann, G. Nicolaus, W. Hahn and H. Elmenhorst
A diterpenoid alkaloid from *Aconitum vilmorinianum* var. *patentipilum*	3694	L. Ding, Y. Chen, F. Wu and B. Li

Number 12

Announcement	vii	
Growth and Metabolism		
3-(hydroxyacetyl)Indole, a plant growth regulator from the Oregon red alga *Prionitis lanceolata*	3697	M. Bernart and W. H. Gerwick
Substituted truxillic and truxinic acids in cell walls of *Cynodon dactylon*	3699	R. D. Hartley, W. H. Morrison III, F. Balza and G. H. N. Towers
Cross-linking of cell wall phenolic arabinoxylans in graminaceous plants	3705	R. D. Hartley, W. H. Morrison III, D. S. Himmelsbach and W. S. Borneman
Growth, proteins and chlorophyll in *Euglena* adapted to various C/N balances	3711	A. Regnault, F. Piton and R. Calvayrac
Plant phenolics as reductants for ferritin iron release	3717	R. F. Boyer, J. S. McArthur and T. M. Cary
Regulatory mechanisms of tryptic inhibitory activity in cabbage plants	3721	R. M. Broadway and D. L. Missurelli

Partial purification and properties of *S*-adenosyl-L-methionine: (*S*)-tetrahydroprotoberberine-*cis*-*N*-methyltransferase from suspension-cultured cells of *Eschscholtzia* and *Corydalis*	3727	M. Rueffer, G. Zumstein and M. H. Zenk
Modulation of laminarinase activity by Ca^{2+}, dcAMP, phorbol-ester and diacylglycerol in plant cells	3735	Y. Lienart, C. Gautier and H. Driguez
Sensitivities of lipoxygenase-lacking soybean seeds to accelerated aging and their chemiluminescence levels	3739	J. Wang, K. Fujimoto, T. Miyazawa, Y. Endo and K. Kitamura
A new class of herbicide which inhibits acetyl-CoA carboxylase in sensitive plant species	3743	K. A. Walker, S. M. Ridley, T. Lewis and J. L. Harwood
Arachidonic and eicosapentaenoic acids in Brachytheciaceae and Hypnaceae moss species	3749	C. E. Hansen and P. Rossi
Effects of γ-irradiation on the level of low molecular substances in spinach cultured cells, callus tissue and seedlings	3755	A. Hiraoka, M. Watanabe, M. Masada and M. Satô
Antioxidative activities of algal extracts, synergistic effect with vitamin E	3759	B. Le Tutour
Changes of the triterpenoid patterns during formation of the fruit body in *Ganoderma lucidum*	3767	M. Hirotani and T. Furuya
Antioxidant activities of lignans and flavonoids	3773	M. Fauré, E. Lissi, R. Torres and L. A. Videla
Ecological Biochemistry		
Detection and quantification of the fungal phytotoxin tenuazonic acid produced by *Pyricularia oryzae*	3777	M. H. Lebrun, F. Dutfoy, F. Gaudemer, G. Kunesch and A. Gaudemer
An *Agrobacterium* signal compound from grapevine cultivars	3785	P. A. Spencer, A. Tanaka and G. H. N. Towers
Effect of potassium nitrate on gramine content and resistance of barley against the aphid *Schizaphis graminum*	3789	M. L. Salas, L. J. Corcuera and V. H. Argandoña
Biosynthesis		
β-Isoxazolinone-alanine is involved in the biosynthesis of the neurotoxin β-*N*-oxalyl-L-α,β-diaminopropionic acid	3793	F. Lambein, G. Ongena and Y.-H. Kuo
The short chain condensing enzyme has a widespread occurrence in the fatty acid synthetases from higher plants	3797	M. C. Walsh, W. E. Klopfenstein and J. L. Harwood
Biosynthetically directed microbiological transformations with the fungus *Trichothecium roseum*	3801	M. Alam and J. R. Hanson
The microbiological transformation of steviol derivatives by *Rhizopus stolinifer* and *Gibberella fujikuroi*	3805	J. R. Hanson and B. H. de Oliveira
Rubber transferase activity in rubber particles of guayule	3809	K. Cornish and R. A. Backhaus
Cell Culture and Biotechnology		
Extracellular polysaccharides from *Pteridium aquilinum* suspension cultures	3815	M. B. Watson, A. R. White and H. W. Elmore
Ecdysteroid production in tissue cultures of *Polypodium vulgare*	3819	F. Camps, E. Claveria, J. Coll, M.-P. Marco, J. Messeguer and E. Melé
Phenyl glucosides from a hairy root culture of *Swertia japonica*	3823	K. Ishimaru, H. Sudo, M. Satake and K. Shimomura
Tannin production in root culture of *Sanguisorba officinalis*	3827	K. Ishimaru, M. Hirose, K. Takahashi, K. Koyama and K. Shimomura

Chemotaxonomy

Tumour-inhibitory aryltetralin lignans in *Podophyllum versipelle*, *Diphylleia cymosa* and *Diphylleia grayi* 3831 A. J. Broomhead and P. M. Dewick

Aryltetralin lignans from *Linum flavum* and *Linum capitatum* 3839 A. J. Broomhead and P. M. Dewick

(−)-Thaipetaline, a tetrahydroprotoberberine from a Malayan Annonaceae 3845 M. Lavault, H. Guinaudeau, J. Bruneton, T. Sevenet and H. A. Hadi

Plant Chemistry

Acetylenes from *Cirsium japonicum* 3849 Y. Takaishi, T. Okuyama, A. Masuda, K. Nakano, K. Murakami and T. Tomimatsu

Phenylbutan-2-one β-D-glucosides from raspberry fruit 3853 A. Pabst, D. Barron, J. Adda and P. Schreier

Lactiflorin, a monoterpene glycoside from paeony root 3859 J. Yu, J. A. Elix and M. N. Iskander

Two iridoid glycosides from *Chaenorrhinum minus* 3865 J. Breinholt, J. S. Jensen, S. R. Jensen and B. J. Nielsen

Sesquiterpene esters, triptogelin A-1–A-4, from *Tripterygium wilfordii* var. *regelii* 3869 Y. Takaishi, H. Noguchi, K. Murakami, K. Nakano and T. Tomimatsu

Sesquiterpene lactone aglycones and glycosides and inositol derivatives from *Hymenoxys biennis* 3875 F. Gao, H. Wang and T. J. Mabry

Heliangolides from *Stevia yaconensis* var. *aristifera* 3881 R. R. Gil, J. C. Oberti, A. B. Gutiérrez and W. Herz

A triterpenoid glycoside from *Menyanthes trifoliata* 3885 Z. Janeczko, J. Sendra, K. Kmieć and C. H. Brieskorn

A triterpenoid saponin from *Polycarpone loeflingiae* 3889 S. P. S. Bhandari, P. K. Agrawal and H. S. Garg

Steroidal saponins from *Chlorophytum malayense* 3893 X.-C. Li, D.-Z. Wang and C.-R. Yang

Steroidal saponins from *Diuranthera major* 3899 X.-C. Li, Y.-F. Wang, D.-Z. Wang and C.-R. Yang

Anthraquinones from *Rhamnus formosana* 3903 C.-N. Lin, M.-I. Chung and C.-M. Lu

Chalcones from *Angelica keiskei* 3907 K. Baba, K. Nakata, M. Taniguchi, T. Kido and M. Kozawa

Iryantherins, lignoflavonoids of novel structural types from the Myristicaceae 3911 L. M. Conserva, M. Yoshida, O. R. Gottlieb, J. C. Martinez V. and H. E. Gottlieb

Kaempferol 3-*O*-sophoroside-7-*O*-α-L-arabinofuranoside, neohesperidosides and other flavonoids from the fern *Pyrrosia serpens* 3919 K. R. Markham and O. M. Andersen

The isoflavone 6-prenylisocaviunin from *Sopubia delphinifolia* 3921 V. K. Saxena and B. K. Bhadoria

Glycosidic alkaloids from *Lupinus hirsutus* 3923 S. Takamatsu, K. Saito, T. Sekine, S. Ohmiya, H. Kubo, H. Otomasu and I. Murakoshi

Isospiropachysine, a steroidal alkaloid from *Pachysandra axillaris* 3927 Chiu Minghua, Nie Ruilin, Li Zhongrong and Zhou Jun

Short Reports

Hydroxycinnamic acid amides from *Iochroma cyaneum* 3931 E. A. Sattar, H. Glasl, A. Nahrstedt, S.H. Hilal, A. Y. Zaki and S. M. H. El-Zalabani

Structural revision of a putative cyanogenic glucoside from *Ilex aquifolium*	3934	A. Nahrstedt and V. Wray
Two keto alcohols from *Crinum augustum*	3936	M. A. Abd El-hafiz
Iridoids from *Plantago media*	3938	H. Saadi, N. Handjieva, S. Popov and L. Evstatieva
A Diels–Alder adduct and other constituents from *Cineraria* species	3940	P. Gonser, J. Jakupovic, G. Crou and L. Vincent
Leaianafulvene, a sesquiterpenoid fulvene derivative from cultures of *Mycena leaiana*	3942	U. Harttig, T. Anke, A. Scherer and W. Steglich
Guaiane ester from *Moscharia pinnatifida*	3944	P. Singh and A. Suri
A guaianolide from *Amberboa tubuliflora*	3946	A. A. Ahmed, M. A. El-Ela, J. Jakupovic, A. A. Seif El-Din and M. El-Ghazouly
A sesquiterpene lactone from *Achillea millefolium* subsp. *millefolium*	3948	A. Ulubelen, S. Öksüz and A. Schuster
17-Acetoxymulinic acid, a rearranged diterpenoid from *Mulinum crassifolium*	3950	L. A. Loyola, G. Morales, M. C. de la Torre, S. Pedreros and B. Rodríguez
Revised structure of a diterpene from *Euphorbia antiquorum*	3952	Min Zhi-da, Wu Bing, Zheng Qi-tai, M. Mizuno, M. Iinuma and T. Tanaka
Congeners of norditerpene dilactones from *Podocarpus nagi*	3953	B.-P. Ying, I. Kubo, Chairul, T. Matsumoto and Y. Hayashi
Ursane triterpenoids from *Nepeta eriostachia*	3956	S. P. S. Bhandari, H. S. Garg, P. K. Agrawal and D. S. Bhakuni
Spathodic acid: a triterpene acid from the stem bark of *Spathodea campanulata*	3959	S. Ngouela, B. Nyasse, E. Tsamo, B. L. Sondengam and J. D. Connolly
A triterpenoid acid, lantadene D from *Lantana camara* var. *aculeata*	3961	O. P. Sharma, R. K. Dawra and D. Ramesh
Nimbocinol and 17-epinimbocinol from the nimbidin fraction of neem oil	3963	B. R. Gaikwad, T. Mayelvaganan, B. A. Vyas and S. V. Bhat
A dihydroxyketosteroid from the marine red alga *Hypnea musciformis*	3965	M. Babu, J., Sridharan R., H. H. Mathur and G. K. Trivedi
A pregnane triglycoside from *Oxystelma esculentum*	3967	R. Trivedi, A. Khare and M. P. Khare
Umbrosone, an *ortho*-quinone from *Hyptis umbrosa*	3971	F. Delle Monache, G. Delle Monache, E. Gacs-Baitz, J. S. De Barros Coelho, I. L. De Albuquerque, A. De Andrade Chiappeta and J. F. De Mello
2-Ethoxycarbonyl-1-hydroxyanthraquinone from *Rubia akane*	3973	E. Okuyama, K. Sato and K. Yoshihira
Ochnabianthrone: a *trans*-9,9′-bianthrone from *Ochna pulchra*	3974	S. Sibanda, C. Nyanyira, M. Nicoletti and C. Galeffi
A phenolic glycoside from *Hypoxis obtusa*	3977	J. D. Msonthi, M. Toyota, A. Marston and K. Hostettmann
Plicatin A and B, two phenolic cinnamates from *Psoralea plicata*	3979	N. Rasool, A. Q. Khan and A. Malik

6-Methoxymurranganon derivatives from the aerial parts of *Phebalium elatius* subsp. *beckleri*	3982	J. A. El-Turbi, J. A. Armstrong, A. I. Gray and P. G. Waterman
4-Arylcoumarins from *Coutarea hexandra*	3984	G. Delle Monache, B. Botta, V. Vinciguerra and R. Moura Pinheiro
Diarylpropanes from *Iryanthera ulei*	3986	L. M. Conserva, M. Yoshida and O. R. Gottlieb
Two flavonol glycosides from *Chenopodium ambrosioides*	3988	N. Jain, M. S. Alam, M. Kamil, M. Ilyas, M. Niwa and A. Sakae
A moskachan from roots of *Ruta chalepensis*	3991	A. Ulubelen and N. Tan
Structure revision of a minor alkaloid from *Broussonetia zeylanica*	3993	E. V. Dehmlow, A. Sleegers, N. Risch, W. Trowitzsch-Kienast, V. Wray and A. A. L. Gunatilaka
Book Reviews		
History of the American Society of Plant Physiologists: by J. B. Hanson	3997	J. D. Ross
Cyanide Compounds in Biology: edited by D. Evered and S. Harnett	3997	J. B. Harborne
Short Book Reviews	3997	J. B. Harborne
Corrigenda	3999	